The Bancroft Library

University of California · Berkeley

Sidney T. Harding

A LIFE IN WESTERN WATER DEVELOPMENT

Edited by Gerald J. Giefer

Statewide Water Resources Center, University of California
in cooperation with the
Regional Oral History Office, Bancroft Library, Berkeley

Berkeley, 1967

S. T. Harding 1949

All uses of this manuscript are covered by an agreement between the Regents of the University of California and Sidney T. Harding, dated 4 December 1967. The manuscript is thereby made available for research purposes. All literary rights in the manuscript, including the right to publish, are reserved to the Bancroft Library of the University of California at Berkeley. No part of the manuscript may be quoted for publication without the written permission of the Director of the Bancroft Library of the University of California at Berkeley.

PREFACE

The following interview is one of a series on "The Oral History of California Water Resources Development" sponsored by the Water Resources Center of the University of California and conducted at the Los Angeles and Berkeley campuses of the University during 1965, 1966, and 1967. In setting up the project, the nature and scope of the work was described as follows:

> The basic purpose of this program will be to document historical developments in California's water resources by means of tape recorded interviews with men who have played a prominent role in this field. Much of the published material on California's water resources describes engineering and economic studies of specific water projects. Little, however, is devoted to the concepts, evolution of plans, and areas of authority exercised by various interested Federal, State and local agencies.
>
> For example, there is little reference material with regard to the transition of administration of the Central Valley Project from the State of California to the U.S. Bureau of Reclamation in the early 1930's. Similarly, the negotiations leading to contracts for water between the State of California and the Metropolitan Water District of Southern California are not documented. Yet, both of these agreements had profound effects on water resources policy in California. Recorded interviews can piece together these important links in California's water resources history. The resulting material will provide a valuable fund of information for researchers in the years to come.

The Berkeley project is under the faculty direction of J.W. Johnson, Director, Hydraulics Engineering Laboratory;

Professor, Hydraulic Engineering, and David K. Todd, Ph.D., Professor of Civil Engineering. Gerald J. Giefer, Librarian, Water Resources Center Archives, is responsible for the interviewing and processing of the manuscripts which are being handled in co-operation with the Regional Oral History Office of the Bancroft Library. Final manuscripts are available for research at the Water Resources Center, UCLA; Department of Special Collections, Library, UCLA; Department of Special Collections, Library, UC Davis; Water Resources Center Archives, UC Berkeley; The Bancroft Library, UC Berkeley; and the Regional Oral History Office, UC Berkeley.

Included in the series at this date are Harvey O. Banks, Sam Leedom, and Sidney T. Harding. The researcher is also referred to oral history interviews on California water development done previously by the Regional Oral History Office with Frank Adams, Louis Bartlett, Stephen Downey, William Durbrow, Herbert Jones, Charles Lambert, and J. Rupert Mason.

Willa Klug Baum, Head
Regional Oral History Office

15 September 1967

Regional Oral History Office
Room 486 The Bancroft Library
University of California
Berkeley, California

AUTHOR'S PREFACE

This autobiography and oral history has grown like Topsy. Started at the request of the Water Resources Center Archives of the University of California for tape recorded interviews covering my experience in various water matters, it has expanded into a history prepared by myself covering the procedures relating to water in which I have participated.

It is difficult to appraise the value of such a record. To me, its preparation has been the source of much interest and enjoyment. It has been prepared in my recent, less active years when I had time to review my records and check dates and other factual items. To others, its value may be generally limited to those who may be interested in the background of current procedures in the same areas that I have covered.

The interest in this history will diminish in time and at some point in the future the record here may not be worth preserving. Even present interest may not justify inclusion of some of the matters in this history.

The Water Resources Center Archives has assisted in and encouraged the preparation of this material. The function of the Archives is to collect and preserve material relating to the history of water development in the West, primarily in California. It is performing this function effectively. In any such effort there is invariably involved the question of what is worth preserving. Too literal an interpretation can result in the Archives becoming a museum rather than a reference library. Too strict a selection of the material to be preserved can result in the loss of essential records. The

answers to such questions are already needed in relation to the past 125 years of California history. It is safe to assume that this problem will become magnified in the next 100 years, when the volume of available material may encroach on the space available for its preservation. The problems involved in the indexing of these materials so that items may be retrieved will increase as the volume of these materials increases.

I made four taped interviews prior to starting this history. In my opinion, these interviews were reasonably well organized and representative of the results that can be expected from such interviews. They had the usual tendency to skip from one subject to another without definite breaks. The following history is better organized in regard to placing all discussion of each topic in one place. A comparison of this extended history with the taped interviews may indicate the relative merits of these two forms of approach. Probably few whose record it is desired to preserve will have the time to prepare such a detailed history.

Among the incentives which influenced me in undertaking the preparation of this material was the current tendency of economists and political scientists to review our past water history and to be critical of the actions taken. Water development in California has not been free from mistakes, but results secured under conditions at the time should not be judged by the standards of today. In my opinion, the ability and integrity of those who made past decisions on our water problems was fully equal to that of the current academic

reviewers. It is a source of irritation to me to read a supposedly scholarly article on our water development written by someone who has never been in a position where he had to make the decisions on which such developments depend. The use of hindsight to describe how much better it would have been if different decisions had been made lacks consideration of the conditions at the time the decisions were made.

The present authors in this field are generally too young to have been active in the 1920's or, for many of them in the 1930's. It would be difficult for some commentators to place themselves in the position of responsibility for the decisions in these earlier years. Actions then had to be based on what could be accomplished with the resources then available. The current (1967) surplus of public funds usable for almost any purpose with limited responsibility for their repayment is a recent development.

The early progress with the finances then available established the development on which present projects are based. If progress had been delayed until development could be made under present day standards we would not have developed the economy required to finance the present programs. To criticize our early water programs is similar to contending that we should not have built the two lane highways which have been superseded by the freeways. Without the traffic developed by the early highways, we would not have needed or been able to finance the freeways.

My period of active participation in water matters in California began in 1912 and has continued to date (1967). This period has seen the gradual extension of the participation of the state in the control

of the use of its water supplies, and the deterioration of the economic standards for federal projects of both the U.S. Bureau of Reclamation and the U.S. Army Corps of Engineers. An interesting story could be written tracing the history of each of these developments. A detailed history would require extensive search for the contributing legislation and administrative actions relating to this record. The results of these changes could be demonstrated from a review of the highlights of their history.

Looking backward, I do not think that I could have been engaged in more interesting work during the past 55 years than my activities in water matters. Like all work which produces visible results, there is a material interest in the progress being made. To an unusual extent water controversies in arid areas bring out different attitudes and actions by its participants than most other lines of activity. Working in water matters is a sure way to secure an education in human nature that it would be difficult to secure in other lines of work. I am very grateful that my life span and activities fell into this field during these past years.

No comments on my experience in water matters would be complete without an expression of my high regard for the pioneers who started water development in California on its way. The early project leaders worked under difficult conditions and had to be rugged individualists to survive. At the same time the early workers in federal and state investigations included some very high type individuals. I came into this work in California in time to get to know men like C.E. Grunsky, Wm. Ham. Hall and Marston Manson, early California engineers; and G.K. Gilbert and I.C. Russell

of the U.S.G.S. I also had a chance to meet such men as L.A. Nares of the Kings River and Jastro of the Kern County Land Co. Among the older attorneys with whom I worked or worked against were E.J. McCutcheon, James Peck, and Edward Treadwell, all interesting individuals of diverse personalities. My work for the state engineer during the period when much of the policies of the state's participation in the development of its water supply were being established gave me a part in these developments. My work for Wm. F. McClure and Edward Hyatt while each was state engineer gave me a high opinion of their integrity and ability.

This history is lengthy. In addition, the procedures in which I participated on Kings River from 1938 to 1952 were numerous. Its own history became so lengthy that it has been separated from these accounts of other matters. It is always difficult to decide where to stop in preparing such a record. Many minor procedures have been omitted. Perhaps some of those that have been included should also have been omitted.

There are numerous references in this history to items in my bibliographical file. These items are numbered. My bibliographical file contains the various reports, books and articles I have written. There are over three hundred items in it. This file will be given to the Water Resources Center Archives and should be retained intact for use in connection with this history. By references to the bibliographical file in the history some duplication is avoided. The numbering system used for the items in the bibliographical file is generally by date of preparation. Shorter materials in some cases have been grouped with several having the same reference number.

Many thanks are due and gladly given to Prof. J.W. Johnson, Gerald Giefer, and the Water Resources Center Archives staff for encouragement and assistance in the preparation of this record.

S. T. Harding
Professor of Irrigation, Emeritus
August, 1967

TABLE OF CONTENTS

PART I

Statistical Record 1

Marriage and Descendants 7

Work in 1911-1914 8

Teaching at the University of California 10

PART II

Reminiscences of My Engineering Practice 12

Lassen County Investigation 1915 14

Minidoka Project 1915 15

Work in 1916 20

Testimony for Crocker-Huffman L & W Co. 20

Irrigation Pumping Articles 21

Sunnyside Valley Irrigation District 21

Truckee River Adjudication 22

Pumping From Lake Tahoe 27

Carson River Adjudication 29

Washoe Project 30

Interstate Compact Negotiations 32

Truckee-Carson I.D. 1959-62 34

The Feather River in 1918 36

Work for the State 1920-30 42

Investigation in Kern County 1919-20 48

Tulare County Investigations 1920-22 53

San Jacinto River Investigations 1920-22 57

Proposed Prison Sites in the San Jacinto Area 62

Mono Basin 63

California Water Storage Districts 72

Kern River Water Storage District 78

Buena Vista Water Storage District 87

San Joaquin River Water Storage District 97

Tulare Lake Basin Water Storage District 111

Kings River Water Conservation District 117

The Herminghaus Case 122

Bulletin 11 - Ground Water Resources of the Southern San Joaquin Valley 136

Irrigation in the Sierra Foothill Areas 147

Nevada Irrigation District 147

Irrigation Service of Utica Mining Co. 152

General Comments on Foothill Areas 154

The Montague Water Conservation District 156

Association of Western State Engineers 161

Twentieth Annual Convention, Resolution No. 8 166

Land Classification in the San Joaquin Valley 1929-31 173

Bulletin 29 - San Joaquin River Basin 178

Permissible Costs for Irrigation Wster 178

Gin Chow Case for Santa Barbara 181

Union Sugar Co. Case 185

The State Land Settlement Colonies 186

Delhi 191

Durham 194

The Walker Case 195

Cleary's Final Report of June 30, 1931 197

Results after 1931 198

General Comments 200

Proposed Sutter Irrigation District 205

Oakdale Irrigation District 208

Berkeley Olive Association 211

Federal Land Bank Reports in 1933 220

Ventura Co., Orange Co., Santa Clara Valley W.C.D., Hollister and San Juan Valleys and Morgan Hill Gilroy Area 221

Work for the State of Oregon 223

Walla Walla River Case 223

Klamath Lake Case 225

Central Valley Project, Miscellaneous Matters 227

Possible Surplus Water from Kings River 228

C.V.P. Report for U.S.B.R. in 1930 230

C.V.P. after 1935, Procedural Reports 232

The Barrows C.V.P. Studies 234

Hearing on C.V.P. in July 1944 237

Testimony on S912-80th Cong. 1st Sess. on Acreage Limitation 238

The Hassle over the C.V.P. 241

Report in 1936 for National Water Resources Committee on Missouri River down to and including the Platte 243

Work in Arizona 251

Work for Verde Irrigation District 251

Work for Buckeye Irrigation Co. 254

Gate Storage at Horseshoe Dam 259

Work for the San Carlos Irrigation and Drainage District 260

Work for Safford Municipal Utilities 261

Work for the Madera Irrigation District 262

Working with Barnes 263

Reports for Madera Irrigation District 266

Groundwater from the San Joaquin River 270

Other Matters 271

General Comments 274

Work on Utah Lake 277

East Bay Water Co. vs. McLaughlin 285

Water Conservation Conference, Chicago Sept. 7-8, 1944 293

Report on Wagon Wheel Gap Reservoir on Rio Grande in Colorado 301

State Operation of the C.V.P. 307

Work for the Palo Verde Irrigation District 313

Work for Monterey County Flood Control and Water Conservation District 322

Introduction 322

Bulletin 52 and Continuing Ground Water Investigations 324

Storage Investigations 325

Nacimiento Project 328

Relations with San Luis Obispo County 331

Acquirement of Nacimiento Reservoir Lands 333

Nacimiento Water Right 334

General Investigations of Water Resources of Monterey County 336

Salt Water Intrusion 348

Recreation 350

Pajaro River Area 351

Conclusion of My Work 352

Summary 352

National Water Policy, 1950 EUC Report 355

The 1949 ASCE Committee 358

The EJC Report of June 1950 360

Comments on Report of President's Commission 367

Scheidenhelm Committee 369

Actions in 1951 by EJC 370

ASCE Actions on EJC Report 371

Activities After 1951 373

Bureau of Reclamation Reorganization in 1953 373

October 1953 Meeting with McKay 375

Resources for the Future Conference 377

The Second Hoover Commission Report 377

Report of President's Advisory Committee Dec. 12, 1965 380

The EJC Report - Hindsight 381

Work for the Tulare Lake Basin Water Storage District, 1938-52 385

Agreement Between Lower Tule River Irrigation District and Crocket and Gambogy 386

Work for the Vista Irrigation District 391

Work on Bechtels' 1955 Report on the Feather River Project 403

Work for San Bernardino Valley Conservation District 407

Work for Alameda County Water District 410

State Bulletin 81 411

Storage on Arroyo Del Valle 412

Work Relating to the San Francisco Water Department 414

The South Bay Aqueduct 416

Remarks 420

Report on Supplemental Water Supplies for North Santa Clara Valley and Related Service in San Benito and Santa Cruz Counties 422

Bulletin 58 - Northeastern Counties Investigations 431

Consulting Board on Dam at Bidwell Bar Site 438

Agreement of May 16, 1960 between USBR and the State D.W.R. Relating to Division of Water in the Delta 443

Work for the State Reclamation Board 447

Work on Cache Creek Settling Basin 447

Work on Colusa Weir Settling Basin 449

Work for Denver Water Department, 1953-55 451

Report of Consulting Board on Drainability of Lands in the Missouri-Souris Project in North Dakota 465

Report on Drainability of Lands in the Oahe Unit of Missouri River Basin Project 472

Work in Western Kansas in 1912 476

Work in Owens Valley for Los Angeles 479

Report for Carlsbad Municipal Water District 482

Work for Suburban Water Systems 484

Economic Report on Cawelo Water District 488

Appraisal of Value of Water Rights of Boulder Creek Division of Citizens Utilities Co. of California 494

"Water in California" 497

Enclosed Lakes of the Great Basin 500

Evaporation from Water Surfaces 504

The Pacific Southwest Water Plan 513

INTRODUCTION

Professor Harding sets forth the circumstances which prompted this memoir in the Author's Preface. Mrs. Baum, in the Preface, explains how the work fits into a larger project concerned with detailing the history of water development in the State. It remains to me as editor merely to say that it has been a privilege to work with Professor Harding.

Gerald Giefer, Librarian
Water Resources Center Archives
December, 1967

AUTOBIOGRAPHY OF SIDNEY T. HARDING

This autobiography has been prepared for the purpose of recording the history of various items relating to water developments in which I have participated. It also includes the usual statistical detail such as date of birth etc.

In response to the request of the Water Resources Center Archives of the University of California at Berkeley in 1964, I made several recordings relating to different items in the history of water in California. These were satisfactory for their intended purpose but lacked continuity. In this autobiography I have correlated these recordings into this more complete record of my participation in events relating to water resources during the nearly 60 years of my activity in this field.

These comments were not prepared for publication. The matters covered may have usefulness when placed on record, where they may be accessible to anyone who may have need for the background history of any of the events discussed. Such occasional need does not justify general publication. The Water Resources Center Archives represents a publicly available depository in which such records may be preserved for any such future needs.

STATISTICAL RECORD

Born October 20, 1883 in Brookfield,Mass. Son of Henry J. Harding and Alice Twichell Harding. Both parents were descendants of New Englanders extending back prior to the Revolutionary War. The national background on both sides was English.

The family home in 1883 was in Wichita, Kansas. My mother had

returned to the home of her parents for my birth and returned to Wichita when I was about six weeks old. While born in Massachusetts, I have little claim to being an actual New Englander.

I had an older sister Adaline who was born in Wichita in 1880. She married Clive C. Whittaker and lived in Kansas until the 1950's. She died in Phoenix, Arizona in 1958.

Wichita in 1883 was a rough and rapidly growing town. It had one of the wildest of the western booms during the 1880s. My father was employed in the office of the city engineer. When the boom "busted" in the depression of the early 1890s, the family, of necessity, moved to Dallas, Texas, where my father worked for the city engineer. In 1894 a move was made to Tyler, Texas where father became superintendent of the privately owned water system. In 1898 the family returned to Wichita. The family home there had been retained during the Texas migration. Father again worked for the city engineer and, shortly after the return, became city engineer, holding the position until his retirement in 1904.

Schooling through one year of high school was secured in Texas. In Wichita after 2 years in the Wichita High School, I transfered to the preparatory school at Fairmount College, then a small Congregational school, now Wichita State University. After graduating from the preparatory school in 1901, I remained for one year of college at Fairmount.

In the fall of 1902 I went to Ann Arbor and became a student in Civil Engineering at the University of Michigan. As a result of the one year s college work at Fairmount, I was able to secure credit for nearly a year s units at Michigan. By carrying extra units I was able to graduate in three years with the class of 1905.

Mother became ill during the summer of 1903 and I remained with her until her death, on October 3, 1903. This resulted in my enrolling about 3 weeks late in the fall semester at Ann Arbor. I was able to make up the missed work.

In the spring of 1905 my funds ran out and I went to work for Prof. Gardner S. Williams. I was carrying 19 units and worked afternoons and Saturdays on Prof. Williams engineering practice. This included computations for the tables in Williams and Hazen s Hydraulic Tables. Whenever I have used these tables over the years, it has reminded me of this work.

I continued to work for Prof. Williams after graduation, mainly on surveys for a hydro-electric plant on the Huron River near Ann Arbor. While a student I was paid 25 cents per hour. On my graduation this was raised to 30 cents and later to 35 cents. I lived comfortably on this renumeration and saved money. Costs were similarly low at that time.

In November 1905 I went to work for the U.S. Lake Survey with headquarters in Detroit. This is the branch of the U.S. Army Engineers having charge of navigation on the Great Lakes. This work included harbor surveys, hydrology of the Great Lakes and, during the season of 1906, special surveys at Niagara Falls. In 1906 there was much public concern regarding the effect of the diversions for power on the scenic qualities of Niagara Falls. The work there included determinations of the division of the flow of Niagara River between the American and Canadian Falls, the rate of recession of the Horseshoe Falls and surveys of Niagara River to Lake Ontario. This was interesting work. Also Niagara Falls was an interesting place for a young man to spend the summer.

By the spring of 1907, I thought that I needed more varied experience and I became a draftsman for the Russel Wheel and Foundry Co. in Detroit. This firm fabricated structural steel. Detroit in the summer is hot and sticky and working over a drafting board was not attractive to me after having spent my previous years mainly out doors. Fortunately I received an offer of appointment from the then U.S. Reclamation Service for work on the Yakima Project in Washington. I could see that structural drafting had no future for me and I quickly accepted.

The offer at Yakima said it was for a hydraulic computer and draftsman. When I arrived and reported I was told that the only vacancy was as a cost keeper which was dignified by the title of cost engineer. I was a long ways from home and, of necessity, accepted. Cost keeping on construction work was not generally regarded then as professional engineering. I learned later they had tried several individuals with varying background on this work without good results. As a last resort they asked for an engineer but disguised the real intent by calling the work by a different title.

I remained as cost engineer for nearly a year. While I undertook this work with reluctance I secured more benefit from it than I have secured in an equal period of time in any work I have done. The construction program included all types of work. I made monthly trips over all jobs, prepared comparative cost reports and took the progress photos.

In 1908 I was transferred to construction, first, briefly on the repairs of the Clealum Dam. In September 1908 I was made resident engineer on the concrete lining of the Tieton Main Canal. This was

a canyon side location. The lining was precast on the canyon floor and transported to place in the canal. For the steep slopes and limited working space available this design was successful. This canal has been in operation for over 50 years and is still giving good service. We had never heard of slump, water-cement ratios or other modern terms. We used Taylor and Thompson's book on concrete and designed our mixes on the curves it recommended. The resulting mixes were tested by their workability in the 4" thick walls of the concrete shapes.

This concrete lining had been let under contract. Progress had not been satisfactory and the contract was suspended. The work was being handled by force account. After the takeover, the contractors superintendent was employed by the Reclamation Service and placed in charge of the construction operations, and the resident engineer was in charge of the inspection and the compliance with the specifications. The only trouble with this form of organization was that both reported to the same project engineer. Specifications which increased the cost without being essential to the quality of the product were difficult to enforce. A good quality of work was secured even though such specifications as those relating to variations in size of the shapes were not as rigidly enforced as they had been under the contract.

During the winter of 1908-09, when the concrete lining in the Canyon Division of the project was shut down, I was transferred to office work and canal location in the Valley Division. I went back to the Canyon for the 1909 season and remained until the completion of the Tieton Main Canal late that year.

Feeling the urge to try other work, I resigned from the Bureau of Reclamation and looked for other opportunities. I secured a prospective position as resident engineer of a Carey Act project in Utah,

scheduled to start construction in the spring of 1910. This gave me time to revisit Wichita and Detroit. When I returned to Salt Lake City early in 1910, the project there was unable to complete its financing and other work had to be found.

Father had registered for the drawing for homesteads in the opening of the Uintah Indian Reservation in Eastern Utah in 1905. He drew a low number and had homesteaded near Roosevelt. I bought land there in 1908 and 1909 in anticipation of the construction of the Moffatt Railroad through the Uintah Basin. This railroad has never been built. I later sold part of this land and part was eventually allowed to go for taxea. I retained some of this land until 1964, when I deeded it to my children. It is leased for oil but is strictly wildcat. I learned some useful lessons about land speculation from this experience.

The spring of 1910 was the end of the active promotion of new Carey Act irrigation projects, as the market for their bonds collapsed with the failure of the leading Chicago bond house, Trowbridge-Niver, which had been active in this field. I could not find work in Utah and I went on to Denver. I kept busy for the next year on whatever work I could find in Colorado. This work included subdivisions, surveying, land office practice, canal location in Routt County, land classification and power site investigations for the U.S. Geological Survey, winter railroad construction in southern Colorado (23° below zero), and inspection of the Point of Rocks Dam of the North Sterling Irrigation District in northeastern Colorado.

In May 1911 I was appointed an irrigation expert in the Irrigation Investigation of the then Office of Experiment Stations of the U.S. Department of Agriculture and placed in charge of this work in Montana and North Dakota. An office was established in Helena and work on a general

report on irrigation in Montana was begun. This report was published in 1915 as Bulletin 103 of the Montana Agricultural Experiment Station entitled "Irrigation Development in Montana."

MARRIAGE AND DESCENDANTS

While working in Detroit in 1907, I had met Miss Evelyn Rosso of Mt. Clemens, Michigan. While visiting there in the winter of 1909-10 we became engaged. Due to the uncertainties of my employment at this time our marriage was deferred until 1911. Miss Rosso was teaching school in Highland Park, Detroit. As soon as I had secured a more permanent position in Montana and had gotten started in the work there, I returned to Mt. Clemens. Our marriage took place June 28, 1911. Our first home was in Helena, Montana.

Helen June Harding was born in Berkeley on June 29, 1912. Henry Howard Harding was born there on June 12, 1916 and Stephen T. Harding on Aug. 8, 1919. Helen Harding is now Helen Harding Bretnor. She is a research librarian on the staff of the Bancroft Library of the University of California at Berkeley.

Henry Harding married Ruth Muirhead on July 10, 1939. They have three daughters; Barbara, born March 21, 1941, Marcia, born June 17, 1942 and Sarah born November 9, 1945. Barbara graduated from USC in 1963 and married George McMeem Dec. 27, 1964. Marcia married Hugh Ellis on Sept. 8, 1963 and has a daughter Jennifer. Sarah will be a Junior at USC in Sept. 1965. Barbara has been employed in the advertising research department of the Los Angeles Times. They live in Pasadena where her husband is in the school department. Marcia lives in Berkeley. Her husband works in the Radiation Laboratory on the hill.

Henry Harding has been in the lumber business in Orick and Arcata. He lives in Eureka.

The Harding Family, June 1941
Left to right: daughter Helen; Sidney; wife Evelyn; daughter-in-law (Henry's wife) Ruth; granddaughter Barbara Jane; son Henry; son Stephen.

Stephen T. Harding is with the Harron, Rickard and McCone Co. in San Francisco. This company handles machine tools. He was half way through UCLA when he volunteered for service. After assignment to the Presidio in San Francisco, he attended officers training at Fort Sill, Okla., became a second lieutenant in the field artillery and saw over 2 years service in the Pacific combat areas. He came out of the service a captain, remained in the reserve and is now a lieutenant colonel in command of his local reserve unit. He lives in El Cerrito.

Stephen married Joyce Openshaw on June 6, 1942 while in the service at the Presidio. Stephen D. Harding was born on May 21, 1943 and Jane Harding on July 23, 1948. Stephen D. Harding is now a student at Hayward State College. Jane will be a senior in the El Cerrito High School in September 1965.

WORK 1911 TO 1914

At the end of the field season of 1911, I was transferred to Berkeley, Calif. to work on a survey of the irrigation resources of California being made by the U.S. Department of Agriculture in cooperation with the California State Conservation Commission. In this work I prepared the inventory of the water supply of the state and the portion of the report relating to Central California. The results were published in Bulletin 254 of the Office of Experiment Stations and in the reports of the state commission.

This investigation was the first comprehensive effort to prepare an inventory of the water and land resources of the state. It found about the same total area of irrigable land that has been found in later surveys, but the portion of this acreage which it was estimated could be irrigated was only about one-half that now planned. In 1912 the

height of dams considered feasible was very much less than that of the dams now being built. The costs then considered to be feasible for canal systems precluded planning the conveyance of water from areas of origin to areas of surplus land. For the date at which it was made, this report represents a sound inventory of the resources which it covered. That its results have been superseded in the fifty years after its completion, illustrates the futility of trying to foresee the changes that may occur over such time periods. Todays conditions had not been conceived in 1912; it may be that the conditions fifty years from now will be equally different from these of the present.

On completion of the work in California in 1912 I was transferred to Kansas to undertake a survey of irrigation opportunities in the western part of the state. Following the field work on this assignment, I was transferred to Washington, D.C. for the winter of 1912-13. While there the Kansas report was completed and published as S.D. 1021, 62d Cong. 3d Sess. During this winter I also prepared material for inclusion in Bulletin no.126 by my chief, Samuel Fortier, entitled "Concrete Lining as Applied to Irrigation Canals" published in 1914.

In the spring of 1913 I was assigned to Billings, Montana to undertake experiments on the effect of the use of different amounts of water on crop yields. Fields under farm conditions were secured, different quantities of water used and the resulting yields measured. I also made measurements of the flow in various types of irrigation channels in different parts of Montana to determine the value of their friction factor "n" Kutter's formula. At the end of this field season I was again transferred to Berkeley for the winter where I worked on my reports and other matters until May, 1914.

While in Berkeley during the winter of 1913-14 an opening on the faculty of the University of California became available in its then

Irrigation Department. Mr. A.E. Chandler, who with B.A. Etcheverry comprised this department, resigned to leave at the end of the 1913-14 academic year. I was appointed Assistant Prof. of Irrigation to begin teaching in August 1914.

TEACHING AT THE UNIVERSITY OF CALIFORNIA

I was a member of the faculty of the University of California at Berkeley in active teaching from 1914 to 1949, advancing from assistant professor in 1914 to associate professor in 1918 and professor in 1925. In 1944-45 and 1945-46, following the retirement of Prof. Derleth, I was Chairman of the Civil Engineering Department. I retired on June 30, 1949, after reaching the minimum retirement age of 65 in October 1948. My teaching extended continuously over a period of 35 years. My title was Professor of Irrigation.

The courses I taught included Irrigation Practice, Water Rights and Organizations and Operation and Maintenance of Irrigation Systems. In addition during World War I, I helped out in the instruction in surveying and in World War II in courses in engineering economics, general water supply and sewage engineering.

I wrote the text book for use in my irrigation courses. "Operation and Maintenance of Irrigation Systems" was published in 1917 by the McGraw-Hill Book Co. "Water Rights for Irrigation" was published by the Stanford University Press in 1935. Vol.I of "Irrigation Practice and Engineering" by B.A. Etcheverry was used as the text in the courses in irrigation practice until 1933. A second edition of Vol.I by Etcheverry and Harding was then published by McGraw-Hill. I did nearly all of the writing of this revision.

These texts continued to be used in the courses I taught until my

retirement in 1949. They have not been revised and are all now out of print.

A condition of my original appointment on the university faculty was that I would be able to do consulting work in addition to my teaching. During the teaching terms such outside work was to be subject to the approval of the chairman of the Irrigation Department in order that it would not interfere with my university duties. At other times I was free from university obligations. Throughout my teaching term I participated in outside engineering work in the general fields of irrigation such as: water supply, water requirements, water rights, and project organization. This practice included work in all of the western states with a greater extent of it in California.

Additional detail regarding the Irrigation Department and my part in it are contained in the history of the Department which I recently prepared at the request of the Water Resources Archives.

When California passed its registration act for Civil Engineers in 1925, I was among the early applicants and secured Registration no. 114 which I still have. In later years I secured registration in Arizona, Utah and Colorado when the work I was doing in these states made such registration advisable.

I joined the American Society of Civil Engineers as a junior member in 1905 and progressed through the various grades to the present Fellow. I was a director from District 11 from 1949 to 1951. I also served two terms as a member of the Executive Committee of the Irrigation Division including being its chairman.

When the association of Western State Engineers was organized in 1928 I was appointed one of the two Associate members for California by State Engineer Hyatt and continued such membership for about 25 years.

I attended the meeting of the National Reclamation Association in Boise in 1933 and have continued to be a member since. I have attended all but a few of its annual conventions.

I have participated in the activities of the California Irrigation Districts Association since 1914. At the meeting in Fresno in April 1964 I was given one of the Association Certificates of Honor for service to the association.

Additional comments on the larger items of this consulting practice are included in the later portions of this autobiography. These relate mainly to the assignments where my participation enables me to make comments that may be useful to anyone seeking the history of these local situations.

REMINISCENCES OF MY ENGINEERING PRACTICE

As previously stated I was active in consulting work in the general irrigation field during my teaching and after my retirement from the University. My experience prior to joining the University faculty has already been covered.

The remaining portion of this autobiography is mainly a history of the work with which I have been connected in my consulting engineering practice. It has been prepared primarily as a history of water developments of which I have had direct knowledge during the last 50 years. While my engineering work has extended over 60 years, the more responsible portion had its beginning when I became a faculty member at the University of California in 1914.

The rest of this report represents reminscences relating to conditions and events during the period covered. The emphasis is on these

events rather than on my part in them. Its purpose is to make available the record of these matters as I participated in them and as I had the opportunity to know those who directed the developments that have been made in this period.

The larger part of these reminiscences relate to California matters but they are not limited to this state. Matters in which I participated in other states are included. My own experience has been limited to the western portion of continental United States with some activities in matters relating to national water policies.

A generally chronological arrangement has been used. Events have been discussed in the time sequence in which I have followed them through to the end of my connection with it, in order that the results may be more easily followed.

No strict rules were set to control what would be included. The purpose has been to preserve information which might not be recorded elsewhere and to present points of view that might be overlooked by others.

I have no thesis to support or image to create. As nearly as I have been able, my accounts of events are as accurate and impartial as I can make them. The record presented is from my own participation and, is factually correct to the best of my knowledge. I do not claim that I have been active in these matters, many of them controversial, for so many years without acquiring opinions of my own or prejudices against some individuals and policies. I have tried to subordinate any personal bias and to distinguish between statements of record and performance from my individual views of the individuals involved or the results.

LASSEN COUNTY INVESTIGATION 1915

In 1915 Lassen County made a cooperative agreement with the U.S. Reclamation Service for an investigation of its water resources and their development. Work was begun on this work. Garfield Stubblefield handled the water supply and I handled the land classification. When Lassen County did not meet its share of the costs the work was suspended.

This work has been long forgotten. It is discussed briefly in the 15th Annual Report of the U.S.R.S. for 1915-16. Only two points are worth recording here. Stubblefield and I ran a fly line from what is now Frenchman Reservoir in Sierra Valley to make a rough estimate of the cost of diverting Last Chance Creek through Beckwith Pass to Long Valley tributary to Honey Lake. It could be done but at a cost probably greater than its value. At that time Sierra Valley had a well developed agricultural economy based on the use of its unregulated stream flow. It has continued this economy without showing sufficient interest in securing additional stored water to purchase the use of Frenchman storage. The State's project is now being justified as recreation.

The second item, largely of personal interest to me, was my first acquaintance with Eagle Lake. The lake was relatively high in 1915 and had recently submerged trees around its southern shore. This was the beginning of my interest in Eagle Lake. In 1916 I made reports for the State Water Commission on applications then pending in this area. Later I made my own observations on Eagle Lake extending to the present time. These results are included in my report on "Recent Variations in the Water Supply of the Western Great Basin" published in 1965 by the Water Resources Center of the University of California.

MINIDOKA PROJECT 1915

The Minidoka Project of the U.S. Reclamation Service serves lands on both sides of the Snake River below American Falls. It was one of the earlier U.S.R.S. projects and was operating when the Reclamation Extension Act was passed in 1914.

On the north side of the river around Acequia was a considerable area of blow sand which had been included in the project. The settlers were having difficulty handling these lands and were using 7 to 9 acre feet per acre per year irrigating them.

The Washington D.C. direction of the U.S.R.S. could not understand why any land should need to use such large amounts of water. A provision was included in the 1914 Extension Act requiring operation and maintenance charges to be on an acre foot basis instead of an acreage basis. It was thought in Washington that putting such charges on a quantity basis would result in greater care in the use of water and the reduction of waste.

When the 1915 O and M rates were set on the U.S.R.S. projects, difficulties arose where there were wide variations in the soils within the projects. If a uniform charge per acre foot was used the resulting costs to sandy lands of large water use would be more than the settlers could meet and the better lands of smaller use and generally greater return would secure their water under favorable terms.

To meet these conditions some projects adopted a sliding scale with the price for the first acre foot per acre set high enough to return the major part of the necessary income and additional water placed at lower rates.. In some cases the rates were raised for quantities of use considered to represent waste. This type of rate

enabled the lands requiring more water because of their texture to secure the water they required at a rate they could afford to pay.

The 1915 O and M rate on the North Side Minidoka Project was set at 60 cents for the first acre foot per acre and 5 cents for all additional water. This is a gravity system and the total costs were relatively low. Even this rate resulted in the sandy lands paying about 50% more than the best lands.

Difficulties in settler relations in Montana had resulted in the appointment of I.D. O'Donnell, a successful farmer and manager near Billings as Supervisor of Irrigation for the Montana project of the U.S.R.S. His success there resulted in his being given the same position for all U.S.R.S. projects. In 1915 the situation on the Minidoka project came to his attention and he asked that the U.S.D.A. arrange to have me make a study on how much water the sandy lands there really needed. I had known O'Donnell in my work for the U.S.D.A. near Billings in 1913 and 1914 and had made experiments on the use of water on his farm. I had just finished the Lassen Co. work and was available. I went to Idaho and spent six weeks irrigating these sandy lands, measuring their use of water and taking soil moisture samples to see how much water the soils could retain. The results were included in a report to the cooperating parties.

These soils consist of about 5 feet of light sand over a coarser heavier sand. It was found that only about 4 inches depth of water could be retained from an irrigation regardless of the depth applied. Well prepared land could be irrigated without using over 4 inches depth of irrigation. Any additional water applied percolated to the ground water.

More convincing to the land owners than the results of my soil

moisture samples was the effect on the alfalfa. In July this crop would begin to wilt on the 12th day after the last irrigation regardless of the depth of water that had been applied. By measuring the depth of irrigation on the different checks I could show the farmer that the heavy applications did not carry the crop any longer than the smaller ones.

As a result of these investigations in 1915, the rates in 1916 were placed on a zone basis. Three zones were used, the minimum charge in each being 75 cents per acre foot, for which 1, 3 and 6 acre feet per acre respectively were supplied in each zone. For water in excess of these minimum amounts a uniform rate of 15 cents per acre-foot was charged. These minimum deliveries were intentionally made somewhat less than the requirements under good practice in each zone.

In connection with this work I also visited the Umatilla Project in Oregon which was having serious trouble with its sandy lands. Some of the Umatilla lands required irrigation at 5 or 6 day intervals. The area of this project was later reduced to eliminate the lands which could not be farmed profitably.

In 1915 alfalfa was the only crop that could be grown on the blow sands around Acequia. It was necessary to keep these soils continually moist until the crop reached a stage where it could control the blowing. Rye would be sown and the alfalfa planted in the stubble. Even at best seedings would be lost and levelling would be required. Once having secured a stand, it was necessary to leave it in as long as reasonable yields could be obtained. These lands were productive of good yields once a stand was secured.

In 1919 there was controversy between the land owners in the different zones regarding the operation of the project. The local irrigation

district had taken over the operation of the project. The demands of the sandy lands at the upper end of the project had taken so much of the supply that deliveries to the lower end were inadequate. Litigation had been started to break the zoning system. I was asked to investigate the situation to see if some way could be found to avoid this internal controversy. I spent a couple of weeks on the project, talked to both sides and finally got them into a meeting where they agreed their trouble had been a break down in operation and was not the fault of the zoning. It was agreed that excess deliveries to the upper lands would be restricted until base service had been made to the lower lands. The litigation was dropped.

Over the years I have visited this area several times. Time has accomplished a marked change in the blow sands of 1915. They have been used for annual row crops with good yields. Enough humus has been built up to overcome the soil blowing. The area round Acequia now has the usual appearance of a prosperous farming area.

As a result of this experience with these sandy lands I have always had an interest in experience elsewhere with similar soils. Some such areas overcome their tendency to blow; some do not. The Umatilla Project, as mentioned, included some lands that had to be abandoned. Some Columbia River areas near Pasco have not been successful. Some sandy lands on the Sunnyside Project have improved. Fernley Bench on the Newlands Project has not changed materially.

I have not been able to find a test which could be applied to sandy land in advance of its irrigation which would determine whether it will blow or not when levelled for irrigation. Some indication can be secured from the way the soil may have drifted around its native vegetation. Apparently the dividing line between enough fines to bind the soil and a

deficiency is too indefinite to be shown by a mechanical analysis of the soil. Grain texture may be a factor.

The problem of the irrigation of blow sands has been diminishing since 1915. Present projects are too costly to include lands of large water requirement even if they are productive. Only where deep percolation losses can be recovered should such lands be served.

The effort to secure improvement in the use of water by placing the operation and maintenance charges on an acre-foot basis in the 1914 Extension Act was not, in my opinion, a success. Costs of O and M on the then Reclamation Service projects were generally in the order of $1 per acre per year. The cost per acre-foot of the water received was much less than the cost of the labor required to apply it to the land even though going rates for irrigators then were about $40 per month and found. (Found means board and room). I was offered seasonal employment at this rate in 1913 by one of the land owners near Billings on whose farm I was conducting irrigation experiments for the U.S.D.A. The farmers could not see economy in using additional attention to the water during the irrigations or in spending money for improved land levelling under the then conditions.

Since 1914 the costs of water and of labor and land preparation have all increased. It is still necessary to compare the costs of saving water against the costs of accomplishing the saving. The greater factors in securing improved irrigation practice and reduction in the amount of water used, have been and are, the better yields obtained with more uniform irrigations and the prevention of damage to the land from over irrigation and the resulting need for drainage.

WORK IN 1916

My work in 1916 did not include the start of any major undertakings.

TESTIMONY FOR THE CROCKER HUFFMAN L&W CO.

I was an expert witness in a damage claim case against the Crocker Huffman Land and Water Co., in 1916 testifying for the company. This case involved the loss of an orchard as a result of high ground water. This was claimed to have been caused by seepage from an adjacent canal of long usage. Their irrigated area above the canal had recently been increased and its percolation loss had been more than the natural drainage could remove. The jury gave the plaintiff a substantial award which was later reversed on appeal.

James Peck was the attorney for the company. This case was a test for several other similar claims that would be made if it was successful. It was expected that the plaintiff's neighbors would be his supporting witnesses. To meet this situation Peck sent one of his assistants into the area as a phonograph salesman incognito. He called on the neighbors, demonstrated his wares, made a few sales and got into general conversation with them. Among the subjects discussed was the pending suit against the company. When these neighbors appeared as witnesses and found the salesman participating in the trial and ready to cross-examine them on their previous statements to him, their testimony was much less helpful to the plaintiff.

A peg model of the ground water elevations in the area involved had been made. This was used in the trial. After covering my general results Peck asked me a hypothetical question which included the main facts in the case. It took him 15 minutes to ask this question. It ended by asking my

conclusion on what had caused the high water table and why I had reached this conclusion. I took a minute or less to answer his direct question and then took 45 minutes to explain the why, using the peg model to demonstrate the conditions. The opposing attorney made efforts to stop my arguing the case from the witness stand, but the judge permitted me to proceed when I stated I had not completed my answer to the preceding question.

The Crocker Huffman system was the predecessor of the present Merced Irrigation District. The District later bought the public utility system, constructed Exchequer reservoir and extended the irrigated area.

IRRIGATION PUMPING ARTICLES

The Journal of Electricity Power and Gas was a weekly engineering magazine published in San Francisco covering the field of its title. Recognizing the growing interest in irrigation pumping the editor, Arthur Halloran, in 1916 asked me to edit a section on this subject. I tackled the job. I was expected to fill two pages. I had never realized that weeks went so fast and that it took so much material to fill two pages. We did pretty well for a few months and then stopped the regular department by mutual consent.

I was able to secure a number of good articles from those active in this field but had to prepare much of the material myself. I have all of these articles bound in a volume which is included in my bibliography file. At least I learned a lot from this experience.

SUNNYSIDE VALLEY IRRIGATION DISTRICT

In 1917 the Sunnyside Valley Irrigation District asked me to make a study of the water requirements of the lands in this district. I spent

6 weeks there in June and July. This district was the successor to a private canal company which had been acquired by the U.S. Reclamation Service. The canal was extended and improved and additional water provided by storage. The lands that had been served had different classes of water rights. The water to which these lands were entitled involved their needs for beneficial use.

I spent my time there irrigating lands of different texture and topography. My report discussed the soils which I considered had different water requirements and their reasonable needs. The results were used in their operation and maintenance rates.

In later years the water requirements of the lands in this district became the cause of action in litigation which became Ickes Vs. Fox, 300 U.S. 82 (1937). Secretary of the Interior Ickes had tried to charge $1,000,000 of the cost of additional storage for the Kittitas Unit to the Sunnyside Unit based on his findings of their contract rights under the old canal company contracts. The U.S. Supreme Court held that the extent of these rights based on beneficial use was a matter for state determination and that the Reclamation Service was only the conveyor of the water which the land owners owned. I did not testify in this case although both sides made use of my results.

If I had testified in this case my sympathies would have been with the District. Any testimony I would have given would have been based on the results of my work on the project. It is my understanding that the attorney for the District had the case on a contingency basis and avoided incurring any avoidable costs.

TRUCKEE RIVER ADJUDICATION

In 1917 I was retained to prepare the technical testimony on the

water requirements of the lands receiving water from the Truckee River. This case had been brought by the U.S. to adjudicate these water rights in order to determine the remaining water supply available under the priority of the Truckee-Carson (now Newlands) Project. I was retained by the U.S.

This began work relating to the project which continued intermittently until 1962. It included this adjudication, similar work on the Carson River, and later work for the Truckee Carson Irrigation District in the negotiations relating to the attempt to formulate a compact between California and Nevada, relating to the interstate division of these waters. This whole story is related here.

In the summer of 1917 I made a soil survey of the lands of the defendants served from the Truckee River. In this I was assisted by E.P. Osgood, an engineer of the Reclamation Service. This began an association with Osgood on field work and in general interest in the enclosed lakes of the Great Basin which lasted until his death in 1962. Osgood was a unique personality, a dissenter from many of the accepted common opinions but a loyal friend and tireless worker. Working with him was an experience to be remembered.

In the work on the Truckee River we secured the use of lands on which we handled the irrigation in order to have our own direct results on their water requirements. Osgood handled the irrigation under my general programming. We irrigated some land in the Experiment Farm of the University of Nevada one year and secured alfalfa yields larger than they had secured under their program. We had agreed to reimburse the University for any reduction in yield that we might cause but were not able to collect for the excess. To get the types of soil we desired we irrigated some lands on the farm of the Nevada State Hospital, east of Reno. We secured

good results where we were able to avoid too much cooperation by some of the inmates.

All of the results of this work were used in preparing a water requirement classification of the lands having Truckee River rights based on the soil texture. The testimony regarding the extent of the right of each land owner was based on this classification. The decree in this case recognized differences in the water requirement based on soils although the amounts desired were larger than those I had recommended. Overall the decree represented about a ten per cent reduction from the past average practice.

The testimony regarding the water requirements of the lands in the Truckee-Carson Irrigation District was presented by D.C. Henny, Supervising Engineering of the Reclamation Service who had knowledge of the project during much of its history.

The defendants in this case were represented by several different attorneys. Among them was Patrick McCarran later U.S. Senator. His family had a ranch in the Truckee River Canyon above Wadsworth. In McCarran's cross examination of my testimony I found that I knew more about his ranch than he did. Another attorney, Sardis Summerfield, who had prepared for the case by reading reports on irrigation and getting acquainted with technical terms which he then asked me to define. I enjoyed his cross examination. When he asked me what evapo-transpiration of the lands involved was, I replied that this term did not have a then recognized single meaning but that if he would define the meaning he was using I would be glad to apply it to these lands. All present enjoyed his efforts to define a term he did not understand himself.

After a lengthy trial the court issued a "Temporary Restraining

Order" or temporary decree on Feb.13, 1926. The U.S. had recommended and the court agreed that the decree should be put into effect on a tentative basis so that any defects that might be developed in its operation could be more readily corrected. Harry Dukes was appointed water master and successfully administered the decree until his death in 1938. Later when Boca Reservoir was constucted provisions relating to its use were included in the decree by stipulation. The final decree is dated Sept. 8, 1944.

The tentative Truckee River decree is one of the earlier decrees in which an effort was made to base the extent of beneficial use on the needs of the different soil types. On the projects the lands were divided between bottom and bench areas with different allowances to each. In the Truckee Meadows the decrees were to each land owner with the amounts adjusted generally in proportion to my water requirement classification.

The Truckee River decree defined the rights in terms of acre feet per acre. This practice had been used in the adjudications made in Oregon under their water code adopted in 1909. Earlier decrees had usually been in terms of the rate of diversion with or without a limitation on the length of the irrigation season. Typical of earlier decrees were those in Montana which were in terms of a miners inch per acre all lands included. In 1925 I was chairman of a committee of the Irrigation Division of the A.S.C.E. which assembled results on the terms used to define the extent of irrigation rights in adjudications. The committee prepared a report which was published in Vol.90, Trans. A.S.C.E. p.1074 (1927). Like usual committees the chairman did almost all of the work.

The use of the present water codes in nearly all of the western states has reduced the need for general adjudications of all rights on

each stream. New rights acquired under the permit and license system of such codes are defined at the time their permit terms are issued. To make the administration of streams having both old rights acquired before the adoption of such codes and new code rights effective it was necessary to define the old rights. Such adjudications were frequent in the period from 1910 to 1925.

The Truckee River decree is also one of the first ones in which the U.S. Department of Justice asserted the claim that the U.S. could withdraw unappropriated water, similar to its withdrawal of public land for federal purposes. The decree did not define the basis on which the finding for the Truckee Canal was based. There was no difference in the amount of the U.S. claim under its withdrawal theory or under its proof under state law. This was my introduction to this federal claim which has continued to date with much concern to the holders of rights acquired under state law. It is still unsettled. This is a larger subject than can be adequately discussed here.

I was also retained to prepare the testimony on water measurements for the Pyramid Lake Indian Reservation on the lower Truckee River. Some land was being irrigated by the Indians and there were additional irrigable lands in the Reservation. The decree defined the Indian right in agreement with my testimony on the requirements of this area. The Indian Service made no claim in this case that the Indian had rights to have water continue to reach and maintain Pyramid Lake for fish or recreational purposes. The lake is within the reservation and under the control of the Indians. Such claims have been asserted recently in the compact negotiations. It will be interesting to see if the U.S. is bound by a decree of the federal court. Questions relating to the nature of the water rights of the Indians on Reservations are still active and not finally resolved.

The rights decreed to the Indians in the Truckee River have a priority of 1859, the date the reservation was created. These rights are limited to defined amounts of use. The decree stated the extent of the total right for all of the irrigable land considered to be serveable from the Truckee River but restricts the use in any year to the same rate of use for the area actually irrigated. This decree is also limited to use of these lands by the Indian and ceases when and if these lands may be transferred to others if the lands are released from the Indians and disposed of to others.

There was an early canal which diverted from the Little Truckee River to Sierra Valley. This was not included in the Truckee River Adjudication. In discussions regarding its inclusion, among the U.S. staff in 1917, it was decided that it had been out of use long enough to represent abandonment and it was not made a defendant. In later negotiated procedures a right to this diversion has been recognized.

PUMPING FROM LAKE TAHOE

The Truckee River decree includes the operation of the outlet gates at Lake Tahoe. This had been the subject of an earlier stipulated decree. This earlier decree was included in the Truckee River decree. It provides for the joint operation of Lake Tahoe for the maintenance of flow for the power plants along the Truckee River (Floriston rates) and the fluctuation of Lake Tahoe within a 6 foot range above its rim. Efforts were made by the U.S. to negotiate a larger control of the fluctuation of Lake Tahoe in 1918 and 1919 by the negotiation of flowage easements with the riparian owners around the lake. A few such easements were secured but their extent was too small to justify an attempt to condemn the remainder.

The area of Lake Tahoe is relatively large in relation to its inflow. In periods of deficient runoff the inflow may be less than the evaporation and the lake may fall below its rim. This has occurred within the period of record on the lake. In 1924, 1929, and 1934 pumping from the lake to maintain flow in the Truckee River was permitted by the riparian owners on the lake. In 1931 the lake fell below its rim and Nevada interest sought to secure permission to pump again.

A meeting was called in San Francisco on July 21, 1931 to consider this situation. Governors Rolph of California and Balzar of Nevada jointly presided. No agreement on pumping was reached and there was no pumping in 1931. There has been no pumping since 1934 although the lake has lowered to or below its rim since 1934. With the present extent of development around Lake Tahoe the mechanics of securing the consent of the large number of parties involved make any future pumping improbable.

When efforts to pump were being made in 1931, Governor Rolph appointed Major A.M. Barton as his representative. Barton was the manager of the State Reclamation Board. He was not familiar with Tahoe conditions at that time and asked me to advise him. I sat in on the meetings leading up to the one on July 21. This meeting was held at the Palace Hotel with the two governors at an elevated table. Governor Balzar sat on the left flanked by his advisors. Governor Rolph sat on the right with Barton at his right and myself at Barton's right. When a question would be raised from the floor Rolph would turn to Barton for an answer and Barton would turn to me. I would supply the backgound which Barton would relay to Rolph. While this process was slow, we succeeded in helping Rolph avoid making any inappropriate statements. Attorney General U.S. Webb participated from the audience and carried much of California's case. It was an interesting experience.

CARSON RIVER ADJUDICATION

In 1927 I was asked to prepare testimony for the U.S. on the water requirements of users from the Carson River for use in the case of U.S. vs Alpine Land and Reservoir Co. This was a general adjudication suit which had been filed on May 11, 1925. The users in the Carson Valley had been constructing reservoirs on the upper drainage area. It was thought that the total storage might reduce the inflow to Lahontan Reservoir and deplete the water supply of the Newlands Project.

I undertook this work. It included preparations for testifying on the water requirements of the Newlands Project as well as on the lands of the defendants. I made a soil classification of the irrigated areas. I testified in 1929 on the water requirements of the Project. The field work in the Upper Carson Valley was done mainly in 1930. I testified on the water requirements of the lands of defendants in 1937. A proposed decree was issued in 1951. To date there has been no final decision in this case.

The Newlands Project uses surplus water to irrigate areas in the former Carson Sink and Lake for pasturage. This soil is very heavy and feed production in relation to the water used is small. The landowners operate these areas as a community pasture. Costs are low. In testifying on the needs of the Project in the Carson River adjudication I declined to testify on the water requirements for these pastures as a beneficial use. Such testimony was presented by other witnesses. The irrigation of these pasture lands represents a desirable use of water that would otherwise be evaporated. I did not consider that a claim should be made for a priority for such irrigation that could prevent the irrigation of crop lands of greater productivity.

In the Carson River case the U.S. made the same claims regarding the right of the U.S. to withdraw water from appropriation that it had made in the Truckee River case. Copies of the U.S. briefs came to the attention of interests in Alpine Co., Calif. This U.S. claim resulted in opposition to the proposed decree by California interests and to date has prevented securing a final decree. It is now 40 years since the complaint in this case was filed with no final results as yet. This delay is adverse to everyone's interest. It is my opinion that a final decree could have been secured in this case within a reasonable period of time if the procedure had not been used to make an attempt to secure a decision favorable to the theory of federal control over unappropriated water.

My direct work on the Carson River adjudication ended with the completion of my testimony.

WASHOE PROJECT

In an effort to find a project to make additional use of the water supply of the Truckee and Carson Rivers, the Bureau of Reclamation developed a plan called the Washoe Project. A report was completed (H.D.181, 84th Cong. Ist Sess.) and such a project was authorized in 1955, Public Law 858, 84th Cong. Chap. 809-2d Sess. S497. This authorization act provided that repayment of irrigation charges for construction for lands in excess of 160 acres for any owner shall be subject to payment of interest. For lands of any owner of less than 160 acres, the usual interest free terms of the Reclamation act are to apply. This method of meeting the excess land controversy is intermediate between the no delivery to excess lands and the complete waiver of the excess land

limitations that had been made in some other projects.

I had no direct part in matters relating to the report on the Washoe Project. It has been a factor in my work, later discussed, on the interstate compact and for the Truckee-Carson I.D. on its internal matters.

The Washoe Project proposed storage on the Little Truckee River in California and on the Carson River in Nevada. Its main source of revenue would have been from the power plant at the Stampede Reservoir.

There has been no construction to date on the Washoe Project except for the Prosser Reservoir. This reservoir on the Little Truckee has been built for fish benefits. Its storage is to be used to replace releases made from Tahoe for the maintenance of fish flows in the Truckee River above Truckee at times when such Tahoe releases would not be made for other purposes.

In an effort to find a unit of the Washoe Project which could be constructed on the Carson River the U.S.B.R. has been investigating the Watasheamu storage, on the East Carson, above Gardnerville. The stored water would, in part, be diverted to the West Carson to supply supplemental water there. The power to be generated would provide a major part of the repayment.

This project, to be feasible, requires that the Newlands Project divert more Truckee River water in order to release Carson River water which it now stores in Lahontan Reservoir. This, in turn, would reduce the Truckee River water available for storage at the Stampede site.

The Upper Carson Valley is a well developed area with an established economy. It is short of late summer water but has operated profitably for many years. Supplemental water will have value but is not a necessity.

The future demand for additional water in this area for municipal use around Reno may require all of the remaining supply that can be developed on the Truckee River. In my opinion, the future overall needs of this general area may make the Carson River portion of the Washoe Project, as proposed, unattractive.

INTERSTATE COMPACT NEGOTIATIONS

The problems relating to the increased development around Lake Tahoe and those involved in the proposed Washoe Project led to suggestions that California and Nevada should negotiate an interstate compact covering the use by each state of these waters. This was expanded to include the Truckee, Carson and Walker Rivers. The required authorizing legislation was secured, the state commissions appointed and negotiations begun. These negotiations have been under way about ten years. No draft of a compact has been completed for submission to the state legislatures and to congress for approval.

In 1959 the Truckee Carson I.D. requested me to advise them regarding their interests in such a compact and to attend the meetings of the compact commission in their behalf. I undertook this assignment and attended the meetings for about a year.

Nevada and California were discussing terms which would be acceptable to them with only limited presentation of the position the U.S. might take. The U.S. is a major party on all three streams. Not only does it have the Newland Project but it has Indian Reservations and Fish and Wild Life claims in Pyramid and Carson Lakes. In view of this situation I asked R.J. Newell, the Federal representative and the Chairman of the Joint Commission to see if he could secure a statement from the Department of Interior of the terms of a compact that would be acceptable to it.

The direct federal interests are all within the Department of the Interior. As Congressional approval is required to make any interstate compact effective I considered such a statement of position was basic to any negotiations.

Mr. Newell agreed to make such an inquiry. He later told me that he had sought such an expression from Secretary Seaton and had been advised not to raise any such issues at that time. That time was July 1960 and the presidential campaign was under way. There were conflicts between the three affected divisions of the Department of the Interior and the Secretary apparently did not want to attempt to resolve them during the campaign.

In view of this political aspect of the negotiations for a compact I could see no further usefulness in my attendance at the Commission meetings. I advised the T.C.I.D. that, in my opinion, it was not worth their costs and my time to attend further negotiations. The District agreed and I ceased my attendance.

In my opinion, the need for this compact is not urgent. Present development has proceeded under existing conditions. The principal problems relate to Lake Tahoe. These have become emotional as well as technical. As the greater part of the runoff originates in California, Nevada can only secure the water California does not retain. If California increases its use of water to an extent that Nevada considers to be injurious to her, court procedures are available to resolve such specific conflicts.

The meetings of the Commission which I attended usually had an attendance of about 50 interested parties. Some appeared to be sincerely attempting to reach a constructive result; some appeared to be interested in delaying progress. Harvey Banks, as California Director of Water

Resources, was the main spokesman for California in the discussions through 1960: his suggestions were directed toward securing progress and the chances of reaching a solution diminished materially when he resigned at the end of 1960.

The problems of Lake Tahoe are the result of trying to retain its pristine conditions and have a large summer population around its shores. These two items are conflicting. People create sewage and sewage creates pollution. In my opinion, the proposed standards of treatment of sewage that may be discharged into the lake and the alternate of exportation of all sewage from the Basin both fail to recognize the economic conditions involved.

A compilation of the man power that has been used during the ten years of these negotiations in comparison with what has been accomplished would be interesting. In my opinion neither the T.C.I.D. nor myself have lost anything by my dropping out in 1960.

A word of appreciation should be expressed for R.J. Newell, the Chairman. He has presided with patience and mild insistence on progress.

TRUCKEE-CARSON IRRIGATION DISTRICT 1959-62

In 1959 when the Truckee-Carson Irrigation District asked me to participate for them in the interstate compact proceedings for the District, I was also asked to advise them regarding matters that were pending relating to the Washoe Project. I undertook such work.

The Truckee-Carson I.D. functions under its repayment contract with the Bureau of Reclamation. This 1926 contract defines the water supply the District is entitled to receive from the water rights of the U.S. on the Truckee and Carson Rivers. It also defines the total area of project lands which may be irrigated.

The T.C.I.D. is the lowest divertor on both the Truckee and Carson Rivers. It develops power from its diversion from the Truckee River. No other user is injured by use by the T.C.I.D. as all water the T.C.I.D. gets has already passed the diversions of others. The rights of other lands under the Truckee River decree are generally senior to those of the U.S.

At times of surplus flow the T.C.I.D. receives excess water. It makes such use as it can of this surplus for power and pasturage. It runs excess water through its canals as a convenience in their operation. These practices have resulted in the appearance of wasteful use and an opinion by outsiders that the T.C.I.D. has an excessive water supply.

In periods of shortage the T.C.I.D. has eliminated the excess diversions and has operated on standards of practice comparable to those in the Upper Carson Valley and the Truckee Meadows. Actual use of water delivered to the farms represents as good a standard of irrigation practice as that of other uses of these two streams.

If the Watasheamu storage should be built on the Carson River it will require changes in the present operations of the T.C.I.D. To make this new unit feasible it will need to be permitted to store water within the storage rights and capacity of Lahontan Reservoir. Such storage of summer flow for later release for winter power development will not be harmful to the T.C.I.D. provided this stored water is returned to Lahontan after its use for power. Such operations can be worked out but will require a carefully prepared operating agreement if future conflicts are to be avoided.

From 1959 to 1962 I worked intermittently on these matters for the T.C.I.D. Among my recommendations I urged that the District should decide whether it wanted to bring its water right area up the full 87,500

permitted under its 1926 contract with the U.S.B.R. or whether it preferred to have a more dependable supply for a somewhat smaller area. I recommended some increase from the then water right area of about 70,000 acres and immediate action to replace tax foreclosed lands with other lands of better quality. The area actually being irrigated was 55,000 to 60,000 acres.

At my last meeting with the Board of the T.C.I.D. on June 25, 1962 this program was approved for immediate action. By November 1962 no progress appeared to have been made. As I saw no benefit to the T.C.I.D. or to myself from a continuation of any further activity on my part on these matters, I advised the District of the termination of my work for them under date of Nov. 5, 1962. I have had no further part in these matters since that date. It is my understanding that matters relating to the 1926 T.C.I.D. contract with the U.S.B.R. have become involved in the compact proceedings since 1962. In my opinion this contract in its present form is binding on both parties and its terms are not a proper subject for discussion in the compact negotiations.

THE FEATHER RIVER IN 1918

In 1918 the stream flow of the Feather River was well below its mean. This condition applied generally to northern California. World War I was under way and there was an active effort being made to increase food production in order that the U.S. might be able to assist in feeding its allies. A federal war food administration had been created with broad general powers in this field.

The two main canals diverting from the Feather River in 1918 (and also to date) were the Western and the Sutter Butte. The Western Canal was owned by the Great Western Power Co. which also owned Lake Almanor

and the power plants along the river. This company was later acquired by the PG&E.

The Sutter Butte Canal operated as a public utility selling water to land owners in its area of service. It was under the jurisdiction of the then California Railroad Commission (now the P.U.C.). This company had been organized mainly to serve lands to which water rights were sold as a means of securing irrigated land values for the lands. The earlier areas served consisted of general crop areas adjacent to the west bank of the Feather River extending from the diversion to south of Gridley. Later when rice irrigation was developed on the clay adobe lands to the west, service was extended to such lands.

Mr. Tulloch was the local manager of the Sutter Butte Canal Company. He had been manager of the Tulloch Ditch on the Stanislaus River. Gordon Hall was president of the company. Tulloch had secured his experience on a canal system where the extent of its service enabled him to carry its records in his head. He was adverse to written records. When he moved to the Sutter Butte Canal he could still follow his former system. However as the extent of service increased after rice production in the western part of the service area expanded, Tulloch's filing cabinet became inadequate to contain all of the information needed. Hall asked me to attempt to help Tulloch out when the water shortage in 1918 became critical.

I went to Gridley and tried to secure enough information to enable me to get started taking some of the load. I found that the only source of the information I needed was an interview with Tulloch. This added to the burden on his time without producing useful results. As a result I devoted myself to an attempt to secure measurements of the diversion and main uses of water which were needed in the canal operation.

The Sutter Butte Canal in 1918 served its earlier water right contract lands devoted to general crops and its more recent area growing rice. The rice needed large amounts of water. When the shortage occurred the general crop lands felt they should have a priority in the use of the available supply. The situation was becoming critical in June when the ponding of the rice checks increased the demands for this crop.

This was also the controversy between the Western and the Sutter Butte canals. The Sutter Butte Canal had the prior right but its diversion was downstream from that of the Western Canal. The diversion dam of the Sutter Butte Canal was the result of past repairs and had a relatively large amount of leakage. It could not hold the river high enough to divert the desired flow into the Sutter Butte Canal without letting a large amount of water pass on downstream. Emergency repairs were attempted but could not be made effective in the short time available.

When the Sutter Butte Canal attempted to compel the Western Canal to let water down for its diversion, the Western Canal pointed to the leakage in the Sutter Butte dam and told the Sutter Butte Canal there was enough water in the river for their needs if they would divert it. This situation was also getting rough.

The deficient runoff in 1918 reduced the output of the hydroelectric power plants and resulted in a power shortage. The Great Western Power Co. was in a relatively favorable position with its Almanor storage to meet the overall power needs. All power in California was pooled under a power administrator. H.G. Butler was appointed to this position under authority of the R.R.C. and with the consent of the power utilities. He had authority to control the release of Almanor storage so that it would produce the maximum power output at the times of greatest need.

Another factor in the diversion by the Sutter Butte Canal was the

operation of the Big Bend power plant a few miles above Oroville. This plant had about 800 acre feet of forelay storage. This was used to enable this plant to operate mainly on the peak load hours. The result was that when the daily average flow of the Feather River at Oroville was 1500 second feet, the actual flow during the day would vary from about 800 to 2,000 second feet. There was not sufficient pondage in the Sutter Butte diversion dam to reregulate this flow.

All of these matters were pending toward the end of June 1918. There was concern that these conflicts would prevent securing maximum crop production from the available supply of Feather River water. The War Food Administration stepped in with the support of the R.R.C. and took over the administration of the river. I was appointed water master on June 29, and told to allocate the available water supply to secure maximum help in the war effort. The War Food Administration ruled that production of rice was more essential to the war effort than the production of alfalfa.

In World War I there was widespread support for an all out effort to help in any available way. I had ample authority to back up any actions I might take. It was necessary to disregard individual entitlements and assign the available supply where it would do the most good.

At the time I was appointed the most urgent need was the filling of the rice checks. The available supply was divided between the two canals so that the rice areas under each were served. This took about three weeks. During this period some alfalfa had to have its irrigation deferred with some limited amounts of reduction in its yield. When the rice checks were filled, the demand for this crop was reduced and the needs of all crops could be met. In 1918 rice practice consisted of 3 or 4 flushing irrigation to get the rice high enough to stand submergence

before the checks were filled. Present practice fills the checks earlier. Under present practice the conditions of 1918 would be largely avoided as the rice checks would be filled before the period of major demand for general crops.

As water master I worked closely with Butler, the power administrator. We had an understanding that, if I had to call for storage release from Almanor, he, as power administrator, would have the water released. We also had an understanding that I would not call for storage release at a time when it was not needed for power use except to meet an emergency if one should arise. Actually no releases not usable for power were required. As indicated above, the operations of the Feather River Watermaster in 1918 were above and beyond the principles of civil law. There was no time to define or to recognize prior rights. The resulting damage was kept to a minimum.

To the credit of all concerned, particularly of the water users, none of my actions were ever attacked by anyone having water rights on the river. The program followed was accepted as a part of the neccessity of the war.

The only difficulty which I had was a minor skirmish with the Fish and Game people. The Sutter Butte Canal had a rack type fish screen across the canal near its head with a narrow opening between the bars. It was not possible to keep this screen clear of the fine debris in the water such as leaves. As a result it required a loss of head of about 6 inches to force the discharge through the screen. The diversion of the canal was about 900 second feet. The upstream elevation of the water could not be increased to offset this loss of head with the then available diversion dam. Consequently the fish screen was reducing the diversion obtainable by about 60 second feet. In view of these conditions, I

ordered the fish screen to be removed.

When we had it about one-half out, the local game warden and one of his higher ups appeared on the scene and started to order me to replace the screen. They were unable to define the injury to the fish that would result if the diversion was not screened. I refused to replace the screens and they threatened legal action leading to my imprisonment if convicted. I then offered to replace the screen if they would take the responsibility of telling the War Food Administration and the public of the extent of their interference with the war effort. That was the last I heard of replacing the fish screen during my period as water master. After the emergency had passed the screen was replaced.

As soon as the peak demand for filling the rice checks had been met, conditions settled down and the services of a water master were no longer required. I ended my active control on July 18, 1918 but would have been available later if need for further services had arisen.

These three weeks as water master were busy times. While there was general support for the methods being used, the habit of taking advantage of a chance to get some extra water required continual vigilance to see that the instructions I issued were followed.

This was a very interesting experience. While the methods used would not be condoned except under war emergency conditions, the results illustrate what can be accomplished when all interests work for the common good. The spirit in support of World War I in our rural areas was very strong. This was the first war in which the population had been involved and in which their sons were being drafted to fight. The home support was all that could be asked.

Later in 1918, when the records on the river operations became available, I made an analysis of them for the Sutter Butte Canal Co.

The filling of Lake Almanor had been continued after the time when the stream flow at Oroville had decreased below the irrigation demand. This may have been unintentional and the result of a lack of overall river regulation.

After 1918 the Sutter Butte Canal Co. made repairs on its diversion dam which reduced its leakage. In later years the Canal Co. has sold different parts of its system to local irrigation districts for operation b the districts. Irrigation from Feather River weathered the deficient water supply of 1931 and 1934 without the controversies that occurred in 1918.

WORK FOR THE STATE 1920-1930

In the 1920s much of my engineering work was for the State of California under an appointment as Irrigation Engineer, Special Investigations. The work was under the direction of the State Engineer under the various titles used during this period. This work began under W.F. McClure and continued after his death in 1926, briefly under Paul Bailey and more actively under Edward Hyatt.

This work fell into two general classifications. One was the direction of the field work and the preparation of reports on different water supply investigations. The work in Kern and Tulare Counties are in this group. The other consisted of the supervisory and regulatory activities of the state engineer, particularly those relating to the water storage districts. The assignments of larger work are described individually later.

The duties of the State Engineer in the procedure relating to the water storage districts included not only the review of their engineering feasibility but also conduct of their elections and approval of the district plans. The responsibility for these actions rested with the State

Engineer. To assist him in conducting hearings and other duties there were two executive directors. These were W.P. Boone of Fresno and D. Joseph Coyne of Los Angeles. Mr. Boone was chairman of the Kings River Water Association. Mr. Coyne was a lawyer. I acted as the engineer for the state in reviewing the plans proposed relating to the organization of these districts and later their final projects' plans.

The Water Storage District Act includes procedure by the State Engineer covering hearings on the sufficiency of the organization petition, actions on the proposed boundaries including petitions for inclusion or exclusion of lands, and a finding that the lands to be included are susceptible of irrigation from a common source. The State Engineer also conducts the elections on the district organization. As the State Engineer had no one on his staff at that time with experience in conducting elections I fell heir to this work in addition to the duties relating to more direct engineering matters. In effect I was secretary to the State Engineer in water storage district matters as well as consulting engineer.

The Water Conservation District Act was passed for use on Kings River. It provided for three or more irrigation districts to combine in the construction of joint works, particularly storage. The administration of the act was placed with a State Irrigation Board created by the act. This Board consisted of the State Engineer as Chairman and the same two executive directors of the Water Storage District Act. This act was passed in 1923. A petition for the organization of the Kings River Water Conservation District was presented. The board met and organized on June 12, 1924. I was appointed the secretary of this board. This Kings River District was the only one filing a petition with this board. Its procedure continued for several years and then was dropped.

I continued to hold the position of secretary during all of the activity of this board. Details relating to the Kings River procedure are included later in the general Kings River discussion. As my work for the State Engineer relating to the water storage and water conservation districts included recommendations relating to official actions by the state regarding their organization and financing, I did not take other work on projects which might come before the State Engineer for his semi-judicial action. The larger part of my consulting practice during the 1920s was for the state. These districts procedures became dormant during the 1930s and I resumed a more general engineering practice.

The work for the State Engineer in the 1920s was under very congenial conditions in the main. The extent of the discretionary authority of the State Engineer in these district procedures was greater than that for irrigation districts. The main policy standards were set while Mr. McClure was State Engineer, survived during Mr. Bailey's relatively brief tenure and were continued under Mr. Hyatt.

The provision in the water storage district act that the lands to be included must be found to be susceptible of irrigation from a common source was interpreted to include beneficial results from irrigation. Susceptibility because the area proposed to be included was physically serviceable from the common source was not accepted unless the lands proposed for inclusion were also susceptible of producing crops and returns from which the costs could be met. This issue was important in some proposed districts which included lands of high alkali content or shallow depth to hardpan. Exclusions of such lands were required as a condition of approval of the boundaries of some of the proposed water storage districts. The conditions affecting each district are discussed later in the comments on each district.

This concept regarding the quality of land includable in a proposed district had not been enforced in past practice and encountered opposition in some of the proposed districts. Mr. McClure stood firmly behind my land classifications and the boundaries of the districts were adjusted, where needed, in accord with these results.

Another responsibility assigned to the State Engineer under the water storage district act was the appointment of directors to fill vacancies between elections. There were some individual vacancies that occurred and were generally easily filled. In three districts the plan involved the purchase of the existing irrigation systems from their owners who were also large land owners in the district. As voting in water storage districts is on a property basis these owners had elected their representatives on the district board. When negotiations for the purchase of the existing canal systems were undertaken, the attention of the districts was called to the conflict of interest statute. These districts were advised that a purchase of these systems by their existing boards would not be approved. The directors having a conflict of interest resigned. I was assigned the task of canvassing the local eligibles and selecting for recommendation to the State Engineer names for appointments to these vacancies. While this was an interesting assignment it required much effort to sift the local recommendations to find individuals whose business experience was commensurate with the scale of responsibility involved and who had the confidence of the area in their fairness and ability. Such appointments were made. Two of these three districts did not complete their plan and were dissolved. The other is still operating.

The water storage district act provides that assessments shall be proportional to the benefits. Such districts were expected to construct storage for use on lands having varying extents of present water supply

with the benefits proportional to the amounts of supplemental water needed. For such conditions a benefit basis of assessment is logical.

In order to determine the benefits to be derived from the project works it is essential that the service to be received be defined. In two of the larger water storage district planning to acquire the several existing canal systems in the service area, the proposed district plan did not define the existing and proposed service with sufficient definiteness to enable an assessment based on benefits to be made. On this basis I recommended the rejection of these plans and was supported by the State Engineer. We were threatened with court action and other dire consequences but the decision of the State Engineer stood in both districts. Both areas have now proceeded under other plans.

When the activities relating to the water storage districts slackened in the 1930s, Hyatt asked me to prepare reports on the procedure relating to each of the districts and also a report of the general procedural practice and standards that had been used. I did this and such reports were filed in the State Engineer's office. Copies are also in my file of reports which I have prepared.

This procedural work for the State Engineer was not technical engineering except in reviewing districts' plans. It might be called human engineering, as much of the work involved included the problems of the personality of the individual with whom I had to deal. Many amusing anecdotes could be recited relating to some of these individuals. In the 1920s the water leaders were usually individuals with strong enough personalities to stand out in their local areas. They had been used to proceeding without state regulation. Some of them did not recognize that when they changed to a public form of organization to which the state had extended the taxing power and other public privileges, they also were placed under public supervision in order to see that

these powers and privileges were not abused.

In the 1920s the authority to decide these matters was vested in the State Engineer. Action could be secured promptly without lengthy procedural delays. It is my opinion that this power was not abused, that the actions taken were in the public interest without considering their political effects, and that the state was fortunate in having during this period two State Engineers, McClure and Hyatt, having a high sense of their responsibility and the courage to do their duty as they saw it. As for myself, I consider that it was a privilege to have been able to participate in these procedures. It was my responsibility to provide the State Engineer with the correct factual material on which to support my recommendations. It is a satisfaction to me that in the controversies that were involved, no material defects were found in the conclusions in my reports. This does not mean that there was agreement with my conclusions because the differences were vehement and lengthy in some cases. It was a satisfaction in the 1930s to have some of the major opponents thank me for the earlier actions which avoided their going ahead with development that would have been in difficulties in the depression of the 1930s.

Additional comments on the separate investigations and procedural matters relating to my work for the state during the 1920s are made in the discussions of the individual items which follow. These are arranged generally in a chronological order based on the time the particular work began and carrying it through to its end.

INVESTIGATIONS IN KERN COUNTY 1919-20

Concern regarding the ground water lowering that was occurring in northern Kern County began to be felt before the end of World War I. Observations of ground water elevations were begun by the Kern County Land Co. under the direction of their consulting engineer, H.L. Haehl. The land company had begun the sale of land in the Shafter-Wasco area and many wells were beginning to be used to supply irrigation water.

The political situation in Kern County in 1919 was involved. Mr. Jastro was the manager of the Kern County Land Co. He had been chairman of the County Board of Supervisors for many years. There had not been a turnover in the Board of Supervisors for many years. There had been a turnover in the Board of Supervisors following Grand Jury inquiries in 1916. The Kern County Farm Bureau had become a factor in county matters under its president J.J. Deuel. Antagonisms had been built up over the years between the dominant land owner in the irrigated area of the county and the small farm operators. The older irrigated areas had been colonized by the land company using the common colony system. Land purchases included a considerable portion of English emmigrants. The parents of Harry Barnes, who had field charge of the state's 1920 work in Kern County, had been early English settlers in this area.

In 1919 there was active agitation for improvements in the irrigation conditions in the areas served from Kern River. There was support for storage to improve the usefulness of the Kern River runoff and some preliminary work had been done on storage at the present Isabella site.

There was also a general hassle over the need for drainage on the south side of the river in the general Panama area. High water table conditions there were reducing crop yields in what had been a productive

area. The areas not needing drainage indulged in critical comments on the irrigation practices that had caused this condition. This had aroused a defensive complex in the high water table area and opposition to drainage of my kind.

A report on the local situation had been made in 1919 by A.L. Fellows. He recommended storage. Kern River, like other California streams, is subject to wide variation in its runoff, in some periods continuing over several years. The available records in 1919 of the runoff of Kern River happened to consist of a first half of smaller runoff and a second half of larger supply. To enable storage to be accumulated to meet shortages in the deficient period, Fellows reversed the order of the recorded runoff, and assumed that the more favorable period had occurred first. This simple action materially improved the storage yield as storage capacities up to 1,000,000 acre feet was being considered.

During 1919 these local water matters were very actively under discussion. Charles Lee was chairman of the State Water Commission. The Commission was asked to make an investigation of the situation. However the commission lacked funds for such work. W.F. McClure was State Engineer and had some funds. After much discussion an agreement was made under which Kern County, the Kern County Land Co. and the Tejon Ranch Co. each contributed $5,000 to be matched by $5,000 of state funds to be used by the state in making an investigation of the water resources of the San Joaquin Valley portion of the County. The actual investigations were limited to the eastern San Joaquin Valley portions of the County, primarily Kern River as it was the only substantial source of water supply. It had been understood that Miller and Lux had also agreed to contribute $5,000 to this work. Efforts that were made later to collect this contribution were unsuccessful.

After the arrangements for this investigation had been made, I was asked to take charge of the work under employment by the State Engineer. I accepted and began organizing the program in December 1919.

It was apparent that the main item on which adequate information was lacking was the ground water. Observations on wells on a wider scale than the Land Co. was covering were programmed. Two field engineers were secured to cover the areas north and south of Kern River. The records of the surface stream flow were available for a longer period than had then been secured on most other California streams. Under the terms of the Miller-Haggin agreement, a record of the flow of Kern River at First Point was required for river operation. A.K. Warren was the hydrographer under this agreement. Records beginning in 1894 were available.

Kern River at First Point has a sandy bottom in which there is a continual movement of sand waves. Mr. Warren developed methods of measurement adapted to these conditions. His methods were compared with the measurements we made in 1920 and found to be reliable. Mr. Warren continued his work on Kern River until his retirement. This record represents what may be the longest continuous record secured by any one individual on any California stream.

The field work continued through 1920. Funds were short and the program had to be adjusted to their amount. We had three engineers at Bakersfield, Barnes continuously and others (Arthur Dunlop, Harvey Kilburn, Earl Storie and Don Baker) for various periods. We checked the topographic survey of the Isabella site and excavated a trench across the site of the then proposed concrete dam. I was responsible for the direction of the work. We needed autos for the field men but lacked money to buy them. The county let us have some model T's that they

were going to turn in on new ones and we got one army surplus Model T. I wrote the report and McClure found an additional $2,500 for the cost of its publication as Bulletin 9 of the State Department of Engineering. Its title is "Water Resources of Kern River and Adjacent Streams and their Utilization". The total cost of this work, including the published report in 1920 was $22,500. The above detail has been included here as an illustration of what could be done at such costs at that time.

Bulletin 9 presented an inventory of the water supply of this area that has not been changed essentially by the records of the ensuing 45 years. Its conclusions on the area which this water supply could irrigate have also not been materially modified by later results. Its recommendations of where the available water should be used have been generally followed. The forms of organization and the areas they should include have been changed by the later availability of imported water, first the C.V.P. and now the State project.

Following the completion of Bulletin 9 and the passage of the water storage district act, such districts were organized for the areas of service of both the First Point rights and the Second Point rights. Their story comes later under the discussion of these districts.

Another result of Bulletin 9 was to show quantitatively the conditions of ground water overdraft that existed in the north Kern area. This, with similar results in Tulare County (see later discussion) served to focus public attention on the need for some source of additional water and to secure support for beginning the general studies by the state that eventually resulted in the C.V.P.

An item in the 1920 ground water situation in north Kern County that has generally escaped public recognition was the action of the Kern County Land Co. in stopping further sales of its lands when the

adequecy of the ground water supply came into question. The Land Co. had been selling its lands in the Shafter-Wasco area. The ground water draft on these lands exceeded the replenishment. As soon as the consulting engineer of the Land Co., H.L. Haehl, had enough results to confirm such an overdraft, the Land Co. on his advice stopped further sales. There was a continued demand for such lands and this action by the Land Co. deserves commendation. The last large sale was what had been known as the Hoover Ranch. The Land Co. retained its lands under the Lerdo Canal until the construction of storage at Isabella and the transfer of water released by users south of the river provided a water supply for these lands. They are now being served by the North Kern Water Storage District.

Against the background of conditions in 1920 it is my opinion that the Kern County report (Bulletin 9) represents a real contribution to the progress in this area in determing what water supply was locally available and where it could best be used. No basic errors have been found it its conclusions over the 45 years since this work was done. This work did not involve any objective except to determine the facts. The state at that time was not proposing construction of irrigation works by the state and the Bureau of Reclamation had not entered this area.

The results of the 1920 Kern County investigations should be judged by the conditions at the time the work was done. All conclusions had to be based on applicable cost limitations. At that time the Federal Land Bank was reducing the amount it would loan if the borrower's pumping lift for alfalfa exceeded 65 feet.

The deep well turbine was then relatively new and lacked much of its present efficiency and economy. Bond issues for irrigation districts

exceeding $50 per acre were considered to be questionable.

The progress that has been made in the pumping of ground water is illustrated by our 1920 conclusions relating to the feasibility of securing a ground water supply from the finer sands at the lower end of the Kern River delta. It was recognized that there was available ground water in this area. A few wells had been drilled and equipped but their operation had been unsatisfactory. The gravel envelope type of wells were beginning to be used but experience had not developed the success that is now secured.

In our report we conceded the availability of ground water at reasonable lifts in this area but did not include it in the water supply to be developed. This conclusion was based on the lack of successful pumping at that time. We concluded that successful methods of extracting this supply would be found but deferred counting on it until they had become a demonstrated success. Such a position may seem strange at the present time but it illustrates the progress that has been made in the last 45 years. Successful wells in this area are now routine.

TULARE COUNTY INVESTIGATIONS 1920-22

The conditions in 1920 in Tulare County were similar to those in Kern County. In both areas the increase in ground water pumping was resulting in an overdraft. In addition the action of the Lindsay-Strathmore Irrigation District in pumping from lands along the Kaweah River for conveyance to the District had resulted in what is generally referred to as the "Lindsay-Strathmore case". There was much local concern over the issues involved in this case and also in its effect on the inter-community relations of the areas involved.

After the Kern County investigations had been organized, similar

interest developed in Tulare County. A cooperative program between the county and the state engineer was worked out and a similar water supply study was undertaken. This was financed by contributions of $5000 each by the county and the state for work in 1920.

Similar funds were provided for 1921. Part of the local contribution was provided by the local Water Users Association. The final costs were about $22,000. This covers 2 years field work and the publication of the report. The report is Bulletin 3 of the Division of Engineering and Irrigation entitled "Water Resources of Tulare County and their Utilization".

This work was organized with G.H. Russell handling the Kaweah River area in the northern part of the county and Chester Marliave the Tule River and adjacent small streams in the southern part of the county. I was asked to direct the work and wrote the report.

The desire for this investigation was greater in the Kaweah River area than in the southern part of the county. The Lindsay-Strathmore case was under trial. It was the hope of some of the interested parties that if the state came in to make an impartial study of the situation that some acceptable basis for settling this law suit could be found.

The first requirement for any basis of settlement of such a controversy is a complete knowledge of the facts. We organized the work to secure the facts leaving any proposals relating to the law suit until we had the facts and also had sounded out the attitudes of the parties. Mr. Russell was a very good man for the Kaweah River part of this work. He was a good listener and got along well with both sides. Later he was for many years chief engineering appraiser for the Federal Land Bank at Berkeley. Mr. Marliave was stationed in Porterville. His work there aided in securing public recognition of

their water problems. He later became chief geologist for the state in its water investigations and after that a consultant.

This Tulare County work brought out the overdraft on the ground water in the areas of the county not directly recharged from some of its streams. The specific results are contained in the report. The report was a factor in securing support for the general investigations of the state seeking a source of imported water to meet this overdraft. These general investigations eventually led to the C.V.P.

A part of the results of this Tulare County investigations which is not inluded in Bulletin 3 was the work done in trying to find a basis for settling the Lindsay-Strathmore case. I handled this part of the work. After the newness of the states entry into this area had begun to wear off, I began to discuss with both parties the terms which they might consider acceptable for a settlement. I did not propose any terms until I had found out the position of the parties. I found both sides firm in their position and too far apart to compromise their differences. Both sides wanted to talk about the terms the other side would have to accept as a basis of settlement.

In negotiations attempting to reconcile differences, it has been my experience that progress is not made on this basis. Real progress may be made if the parties are ready to discuss the concessions they will make instead of what the other party must do. We found no common meeting ground in this conflict and proceeded to complete our investigations on the water supply of the county.

In hindsight some observers of the Lindsay-Strathmore case have assumed that a settlement should have been obtainable without the large costs of the different trials or that the plaintiffs were supporting a dog in the manger position. An understanding of this case requires a recognition

of the human factors that were involved as well as the legal principles applicable to the controversy.

The Lindsay-Strathmore District developed its citrus area using its local ground water. The overdraft resulted in ground water lowering and an increase in the salt content of the water pumped. The area faced abandonment of producing acreage unless outside water could be secured. Stephen Kieffer entered the picture with a plan to buy land above the Kaweah River diversions and install wells to produce water to be conveyed to the District. This water bearing land was bought and the system built.

The lower diverters on Kaweah River brought suit to enjoin this pumping on the ground that the water pumped would deplete the stream flow reaching their diversions. In the earlier stages of the suit there were statements made which aroused community feelings to the point where neither side could retreat. The District disclaimed that their operations affected the river. The lower users were equally insistent on it.

The case went to trial. Lindsay secured outside lawyers and expert witnesses to support their position. The lower canals used local talent. H.H. Holley did the engineering work on the case for the plaintiffs; H.L. Haehl, B.A. Etcheverry, Thomas Means and others were experts for Lindsay. W.R. Bailey carried much of the legal load for the plaintiffs. Lindsay had former California supreme court judge Sloss and others.

The trials were lengthy. One trial was completed before Judge Wallace of the Tulare County Superior Court. After the completion of the trial, Lindsay secured his disqualification based on his ownership of land in Visalia whose value might be affected by the outcome of the case. This disqualification has resulted in local judges avoiding trying local water cases. An outside judge was appointed and started

to hear the case when it was found that some relative had a lot in Lindsay and he withdrew. Judge Stephen was eventually appointed, tried the case, and made the decision which was appealed and became the final decree. Total costs of all of these procedures was reported to be about $1,500,000. The decision became final in 1935.

When the decision became final and the lower canals had won, they did just what they had told me they would do in 1922. The lower canals were willing to let Lindsay have water for its survival once the plaintiffs rights had been recognized by the courts. If Lindsay had won the law suit other similar pumping along the upper Kaweah River could have materially reduced the down stream river flow. The plaintiffs were resolved that they would establish their legal position before they would compromise the suit. Having won they then made a settlement which enabled Lindsay to secure water until C.V.P. water became available.

SAN JACINTO RIVER INVESTIGATIONS

In 1921 there were controversies pending between the five areas and users of the San Jacinto River. Litigation was pending in the court and protests had been filed against applications before the State Water Commission. Charles H. Lee was then the Executive Member of the Water Commission and attempted to get the five parties to agree on some settlement. The lack of factual results on which to base such a settlement became apparent. In June of 1921 I was asked to make an examination of this situation and to advise the Water Commission whether the available information would enable them to act on the pending applications and if the conclusion on this item was no to prepare an outline of the investigations that would be needed to supply support for such action. I spent about a week in the area and on July 18, 1921 submitted a

preliminary report: "Water Supply Conditions on San Jacinto River Drainage Area and Outline of Investigations Recommended to be Undertaken." This report recommended that field investigations should be made covering at least one year's water supply and use. It suggested cooperative financing of the costs by the local interests and the state.

The five parties involved were (1) the Lake Hemet Water Co., then a public utility serving lands around Hemet and owning the Hemet reservoir; (2) the Fruitvale Mutual Water Co., serving lands around San Jacinto and spreading water of the San Jacinto River to replenish its ground water draft; (3) Lake Elsinore area interests represented by the Elsinore Valley Water Users Association desiring to maintain inflow to support the recreational value of the Lake; (4) the Temescal Water Co., having pumping rights along the San Jacinto River near Ethanac in the Perris Valley area and conveying the water pumped to its area of service around Corona; and (5) the Perris Valley area represented by the Perris Valley Chamber of Commerce seeking a source to augment its overdrawn ground water.

After further discussions among the parties an agreement was made under which each of the five local interests contributed $1000 and the state $3000 toward the cost of an investigation scheduled to continue for one year. As the State Water Commission supplied 2/3 of the States contribution, the general direction of this work was placed with the Commission. Mr. R.H. Jamison was secured to handle the field work. I was asked to take general direction and to prepare the report.

The estimated budget for this work called for one field engineer at a salary of $250 per month, plus $150 per month for auto and other expenses and $100 per month for general expenses, a total of $6000 for one year. To allow for part time help such as rodmen and for printing

the report, $2000 was added to make a total estimated cost of $8000. This detail is given here as an illustration of what could be secured for such costs under the 1921 value of the dollar.

The agreement was completed and field work started in October 1921. The wells to be observed had been selected before the large runoff which occurred in December 1921. The work covered a year of above average water supply.

The report on this work is entitled, "San Jacinto River Hydrographic Investigation, 1922". It was dated December 1922. The State Water Commission had been succeeded by the Division of Water Rights in the Department of Public Works, the office had been moved from San Francisco to Sacramento and Charles H. Lee had been succeeded by H.A. Kluegel, as Chief of the Division. This report was not given a bulletin number. Copies were distributed to the interested parties in the affected area. This work is discussed in Part III of the Biennial Report of the Division of Water Rights dated November 1, 1924, p.78.

This report was primarily a water supply inventory of the area covered. It strongly urged adjustment of points of difference between the conflicting interests by negotiation rather than by litigation.

Following the completion of the report meetings were held with the interested parties seeking agreement on an allotment of the available water supply among the conflicting interests. The five principle parties on July 13, 1923 requested the Division of Water Rights to prepare a tentative schedule for the use of the waters of the San Jacinto River. After further meetings such a schedule was prepared in September 1924 and circulated among the parties. Mr. Edward Hyatt had become the Chief of the Division of Water Rights. The parties had 60 days on which to comment on this allotment. I did the main work in the preparation of the September 1924 allotment.

After further discussions with the parties a Second Tentative Allotment was prepared under my authorship. This made some adjustments in the first allotment to meet the comments of the affected parties. In 1926 there was further discussion of the allotment between the Lake Hemet Water Co. and the Fruitvale Mutual Water Co. I prepared a tabulation of stream and diversion records applicable to these two users in 1926. In August 1927, following further discussions among the parties I prepared a revised tentative allotment between these two parties.

As a result of their investigations and negotiations the pending local litigation was allowed to lapse. The Temescal Water Co. built storage in Railroad Canyon above Lake Elsinore and reduced its draft on the ground water in the Ethanac area. The State took action on the applications before it in harmony with these results.

In later years this area has joined the Metropolitan Water District and is receiving Colorado River water. All that the 1922 investigations could do was to define the existing local supply and assist in reaching local agreements on its use. This was accomplished. It also brought out the inadequacy of the local sources of supply to meet the needs of the area but could not at that time even suggest where additional water might be obtained.

The observations, particularly on ground water in 1922, have furnished a useful basis for comparison with conditions in later years. Such observations can only be made for current conditions and, if not secured, cannot be replaced by future activities. One of the items of usefulness of the 1922 work was the ground water inventory as of that time.

The 1922 San Jacinto investigations represent an illustration of

desirable cooperation between local and state agencies seeking a reasonable solution to involved local conflicts. It was a very satisfying experience to myself. Its results were only secured by the combined efforts of all parties concerned. Mr. Hyatt, who presided at the meetings following the completion of my report, was a very patient and effective negotiator. He held the parties in open discussions without letting the proceedings get out of hand until agreements were reached.

Nearly all of the individuals active in these proceedings are gone now. None were merely obstructive in their attitude although all of them were assertive of the interests of the area they represented.

PROPOSED PRISON SITES IN THE SAN JACINTO AREA

After the completion of the San Jacinto Investigations just described, the state was seeking a site for a new prison in Southern California. Numerous sites were offered for such use. The specifications of the state called for a site on which there could be from 500 to 1500 acres of irrigated crops and a domestic requirement of 150 G.P.D. per capita for a population of 5,500. This represented a requirement of about 1.1 second feet and 800 acre-feet per year.

The sites offered to the state were referred to the State Architect for a report on their water supply as well as their other features. Because of my previous work in the San Jacinto area, Mr. George B. MacDougal, the State Architect, asked me to report on the water supply of the proposed sites there. I made reports in September 1930, August 1932, December 1932, and March 1926, covering a total of 11 sites.

These reports were relatively routine in character. None of the proposed sites was purchased by the state. Several of the areas were in the side valleys adjacent to the main valley and lacked an adequate water supply both in quantity and quality.

The one site on which I reported favorably, proposed to use stock in the Fruitvale Mutual Water Company as the source of its water supply. This was rejected on legal grounds. At that time the state could not own assessable stock in corporations. This limitation has since been removed under some conditions.

It was necessary to secure analyses of the ground water proposed to be used. In one case a report was required for the Selection Board immediately following my field work. I took the water samples to the

Rubidoux laboratory of the state for analysis. They properly insisted on a detailed analysis which would take a week. On my urging they agreed to use more rapid procedures and have the results for me the next morning. The day having been hot, I had used the same water to quench my thirst. About midnight this water made its own report by intestional action. While I secured the results of the analysis the next morning, I already had reached my conclusions on the quality of the water for prison use.

The site finally selected was that at Chino. The selection board considered many sites before making this decision.

MONO BASIN

In August, 1921, the grand jury in Mono County requested the state to make an investigation of conditions relating to the development of Rush and LeeVining Creeks. This request was referred to W.F. McClure, the State Engineer. Mr. McClure, in turn, asked me to make the field investigations and to report on their results. The field work was done during the summer of 1922. Discussions with the federal agencies involved extended through the ensuing months and my report was not completed until December 12, 1922.

There were two main issues involved. The Cain Irrigation Co. had secured rights of way grants on public land for the reservoir sites on Rush Creek under the March 3, 1891 act and amendments. This act granted such storage rights of way for irrigation use, but permitted subsidiary use for power. These grants were permanent. Grants of rights of way for power purposes at the time these grants were secured were limited to 50 year revocable licenses. As the water stored in these reservoirs was used for power in the non-irrigation

season, there was a question whether their use violated the terms under which they had been obtained.

The power development on Rush and LeeVining Creeks was owned by the Nevada California Power Company, and was operated under lease by the Southern Sierras Power Co. The first company distributed and sold power in Nevada and the second served users in Southern California. The Cain Irrigation Company owned the irrigated lands, the canals, and the storage rights at Gem and Agnew Lakes. All three companies had a common ownership. The lands under the Cain Irrigation Company's canal were very porous pumice soil requiring the use of very large amounts of water for their irrigation.

The second issue involved the use of stock in an irrigation company as proof of the water supply for desert land entries. Such entrymen had been located in the Pumice Valley and a water company organized for their service. The U.S. Land Office had refused to accept ownership of such stock for desert entry proofs.

A separate, but generally related matter was the withdrawal of public lands in this area by the U.S. Reclamation Service for irrigation purposes, and the cooperative study made by the service with funds supplied by Los Angeles.

My field work was delayed until July 1922, when access to this area was more easily secured. Copies of my reports and related material are combined in Item 31 in my Bibliographical File. All of these were filed with the State Engineer at the time they were made.

On the issue of the rights of way grants for storage at Gem and Agnew Lakes, I recommended procedure to cancel these grants on the ground that they were not being used in accordance with the terms under which the grants had been made. This recommendation was not

approved by the attorney for the U.S. Forest Service and was not acted upon by Mr. McClure. Nothing was done on this portion of my report. If the rights of way under the 1891 act had been cancelled, the power company could have secured a license under the procedure of the 1920 Federal Power Act. It would not have lost any of its expenditures on these projects, but would have been brought into conformity with the terms under which such public lands could be used.

The water rights on Rush and LeeVining Creeks had been adjudicated in 1915. The decision on Rush Creeks is Case No. 2091 in Mono County. The trial had been conducted and the decision made by Judge Hancock of the San Joaquin County Court who had been assigned to this case in place of the Mono County Judge. Judge Hancock left the bench and was attorney **for the South San Joaquin irrigation district which makes his Rush Creek decree additionally hard to understand.**

This Rush Creek decree was a strange decision. The details are discussed in my report. It granted completed rights to uses in 1915 which had not been put to use then or by 1922. There was a similar decree on LeeVining Creek.

These decrees gave the Power Co. control of all of the waters of these two streams. Rights to the appropriation for the desert entrees were denied. These decrees were not appealed. It was claimed that the time for appeal was allowed to expire as a result of a misunderstanding among the affected parties. A well supported appeal would, in my opinion, have resulted in a reversal of these decisions.

The effort to secure title to the public lands south of Mono Lake followed the practice then commonly used. A mutual water company was formed to supply the water needed for proof on the entries. Prospective entrymen were sought and located on entries for a fee by

the promoters. As residence on the land is not required under desert entries, this appealed to many as an opportunity to get land on favorable terms.

For areas having a feasible water supply, and cost for irrigation together with good land, such developments could and have been successful. In this area the mutual company lacked a water supply and the lands to be served were very porous pumice deposits. Records on similar adjacent lands showed use of water of about 40 acre feet per acre per season with very limited crop production.

As fast as the proofs on these entries reached the U.S. Land Office they made investigations and rejected the proofs. This did not deter the promoters who then organized another mutual water company and relocated other entrymen on the lands whose proof had been rejected. As it took the U.S. Land Office about six months to make its investigations and decisions, there was time for this process to be followed.

The earlier desert entry activity was largely handled by W.D. McPherson. Although he was not active in this matter at the time of my work, he had been the main source of the grand jury action. Mr. J.B. Clover operating from Los Angeles controlled the Rush Creek Mutual Ditch Co. and was still seeking to sell stock to entrymen. I had met Mr. Clover in Denver when I was working in that area in 1910. He was engaged in similar activities there then.

I recommended rejection of desert entries on the area south of Mono Lake having such porous soils, on the basis that these lands were not irrigable practically, and that the use of water on them would not meet a reasonable standard of beneficial use. No specific action was taken on my recommendation on this matter. The withdrawal from entry of these lands by the U.S. Reclamation Service ended such

entries during the period of withdrawal.

Another matter discussed in my report which had not been directly covered by the grand jury action was the withdrawal of public lands in Mono Basin by the U.S. Reclamation Service in 1920. These lands were withdrawn under the authority of the Reclamation Act. This withdrawal removed the withdrawn lands from the jurisdiction of the other federal land agencies.

Mr. Harold Conkling had been transferred from the U.S. Reclamation Service Office in Denver to make the investigations of a proposed project to divert Mono Lake water to Owens Valley, presumably for use there for irrigation. The work was done in cooperation with the City of Los Angeles. Such cooperative investigations were usually made on a 50-50 division of the costs. In this case Los Angeles paid all of the cost.

Conkling's report estimated that 140,000 acre feet per year could be diverted through an eleven mile tunnel to Long Valley reservoir in the Owens Valley at a cost of about $8,000,000. It was estimated that the use of this water for irrigation could only meet one-fourth of this cost. The remainder would have been met from the use of this water for power.

In my report I concluded that the U.S.R.S. withdrawal of public land in the Mono Basin was outside the proper purposes and function of the Reclamation Service and that it should be cancelled. No action was taken at that time on this recommendation. It was apparent that if Mono Basin water should be diverted to the Owens Valley it would continue on to Los Angeles for municipal use. The U.S.R.S. was being used to secure land withdrawals not related to an irrigation project.

The reports in my bibliography file (No. 31) contain the detail supporting my final report. During this work Frederick H. Fowler

was the engineer representing the Forest Service. Walter L. Huber had been the Forest Service engineer; he had entered private practice and was then consulting engineer for the Southern Sierra Power Co. Both were helpful in my work but both were naturally watchful of the interests of their employers.

The matters involved in Mono Basin are also discussed in my "Comments on Economic Evaluation of Water, Part II... Contribution No.42, Water Resources Center, University of California..." (p.6-9.) The cooperative study with Los Angeles is discussed in the annual reports of the U.S.R.S. (19th p.414, 20th p.400, 21st p.120, and 22nd p.138).

While this investigation and report was an interesting assignment, it was not productive of specific results. However it represents an introduction to the later record of developments in this area.

The City of Los Angeles had been in litigation with the Southern Sierras Power Co. over its right to condemn the power company's plant in the Owens River Gorge. The city wanted to build a reservoir there. The company claimed it was in public use and not subject to condemnation. The company won. To block Los Angeles from diverting Mono Basin water to Owens Valley, the power company hurriedly built a power plant on lower LeeVining Creek on a section of school land to which it had fee title. The U.S.R.S. withdrawal prevented the power company from securing rights of way over public lands. Eventually the city negotiated the purchase of the power company's properties which it needed and built its Mono Basin project. The lower LeeVining Creek plant is now abandoned.

The power company naturally resented the use by the U.S.R.S. of its land withdrawal powers as an aid to Los Angeles in its controversy

with the company. A.P. Davis was the director of the U.S.R.S. and responsible for the cooperative agreement with Los Angeles under which this was done. Senator Phipps of Colorado Springs was president of the power company and also a U.S. Senator from Colorado. Secretary of the Interior Work came from Colorado Springs and may have secured his appointment through the support of Senator Phipps. Secretary Work asked for Davis' resignation. Davis offered to resign if he might include in his letter of resignation that he was resigning at the Secretary's request. Work objected to this and wanted the resignation to appear to be voluntary. After considerable hassle the Secretary removed Davis. This action resulted in a protest by the engineering profession. Mr. Davis published a statement dated July 11, 1923 giving his version of this situation. A copy of this statement is in the Water Resources Archives in Berkeley. Mr. Davis' personal reputation was sufficiently high that his standing was not hurt by his dismissal. The facts of this situation have not been seriously questioned. He immediately found other employment and later became the chief engineer of the East Bay Municipal Utility District and selected and constructed its Mokelumne River project. Later he was given Reclamation's Hall of Fame nomination No.6. These nominations were given by the U.S.R.S. as a reward to those of long and distinguished service in the service. This was an appropriate recognition by the Reclamation Service of the value of the services of Mr. Davis. This was awarded after the controversies regarding his dismissal had passed. Mr. A.P. Davis was succeeeed by D.W. Davis, formerly governor of Idaho. The latter did not last long. D.W. Davis was the first politician to become head of the U.S.R.S.

I had met A.P. Davis while working for the U.S.R.S. in 1907-09.

He was highly regarded in the service for his straight forward approach to problems as they arose and his willingness to make decisions. I was a minor contributor to the defense fund raised among engineers in his behalf at the time of his dismissal.

In 1924, a petition for the organization of the Indian Wells-Fremont Water Storage District was presented to the State Engineer. I was asked by the State Engineer to prepare the report on the feasibility of the proposed district. This was done in September 1924. My report is Item 36 in my Bibliography file. A hearing on the petition was held at Mojave on July 25, 1924.

John T. Whistler had made a report for the land owners on this proposed project. He planned to secure his water supply from the tributaries of Mono Lake and bring it to the District through the Owens Valley. It was obvious at that time that any such diversion from the Mono Basin, if made, would be used in Los Angeles. The plan proposed for this district was not feasible for the irrigation proposed, although the lands to be included would be productive with a water supply. I recommended against the approval of the organization of the Indian Wells-Frement W.S.D. This recommendation was approved by Mr. McClure and the petition was rejected. This procedure occurred prior to the purchase of the Power Co. rights in Mono Basin by Los Angeles. The proposed district would have had to acquire these rights in order to secure water for its project. These costs plus the high construction costs that would be required to divert and convey the water to the proposed district exceeded the value of its use for irrigation. There was no further activity on this proposed project after its rejection by the State Engineer.

The City of Los Angeles in connection with its Mono Basin Project

brought suit to condemn the rights of the riparian owners around Mono Lake who might be injured by the lowering of the lake which would result from its diversion. This case was tried in Placerville in about 1934. The jury desired to view the areas involved and were taken on a trip to Mono Lake during the later stages of the trial. As the trial had cost the city some $100,000 at this time, the jury was insured for this trip to cover the loss if injury to any of them should require a retrial. No injuries occurred.

Later Los Angeles constructed its project to divert Mono Basin water into Lake Crowley for regulation and conveyance to Los Angeles. Diversion began in 1940. The extent of this diversion and its effect on Mono Lake are described in my report on Mono Lake of August, 1962. This report is a part of those I have made on the enclosed lakes in the Great Basin.

The active issues in 1922 in the Mono Basin have now been resolved. The power company retains the use of Rush and LeeVining Creeks for power development above the elevation of the diversion to Owens Valley by Los Angeles. The city has the use of the Mono Basin water supply that is divertible by its system. Additional irrigation in the Mono Basin has not been made. The present results represent the best uses of these water supplies. Irrigation in the Mono Basin, even on good lands, has very limited yields and returns due to the short growing season. On the Pumice Valley lands irrigation would not be a beneficial use.

CALIFORNIA WATER STORAGE DISTRICTS

By 1920 California had reached that stage in its water development where storage was needed to enable a larger part of the runoff to be used for irrigation. This need and the opportunities to satisfy it were largely applicable to the Sierra streams in the San Joaquin Valley. While the snow storage in these streams increased the proportion of the annual runoff which occurred during the irrigation season, the snow melt produced more water than could be used directly during its occurrance from April to June with deficient flows in the later summer months.

More economical storage could be secured if all of the diversions on any stream could combine in the construction of joint storage works. Where all use from a stream was under one system, as on the Merced River, such storage could be built by a Wright Act irrigation district. Where only two irrigation districts were involved, storage could be developed on a contractual basis between the two districts. This was done by the Modesto and the Turlock Districts on the Tuolumne River and the Oakdale and South San Joaquin Districts on the Stanislaus.

For streams in the southern San Joaquin Valley, more canal systems were involved and there was need for a form of district to construct the storage and distribute the stored water among the participating systems on a wholesale basis without engaging in any activity within the areas served by the individual canals. This need was greatest on the Kings and Kern Rivers.

To meet this need, the legislature in 1915 passed an act providing for the organization of districts to construct storage. This act was found to contain unconstitutional features and was repealed. It

was succeeded by the water storage district act of 1921. In Tarpey vs. McClure 190 Cal 593, the State Supreme Court sustained the constitutionality of the 1921 act on March 13, 1923. Following this decision, action proceeded on the petitions for the organization of the water storage districts which had been previously filed. It is the 1921 act with its later amendments which has been used for this form of district.

Some of the procedures under the water storage district act have been mentioned in the previous discussion of my work for the State Engineer from 1920 to 1930. The water storage act places all of the organizational procedure of such districts under the State Engineer (now the Director of Water Resources). The State Engineer passes on the sufficiency of the organization petition. He hears petitions for inclusion of additional lands and for exclusion of lands included in the organization petition. He passes on the engineering feasibility and the susceptibility of the included lands to irrigation from the proposed water supply.

The costs of the investigations by the State Engineer are paid by the proponents of the proposed district who are required to provide a bond to cover such costs when the petition for organization is filed.

As previously described, I was appointed the consulting engineer for the State Engineer on water storage district matters. My accounts were submitted to the State Engineer and when approved were submitted to the proponents of the district who then paid me directly. No difficulties arose under this procedure in my work under this act. The State Engineer set the amount of the bond he would require from the proponents. This amount was based on the estimated costs for the individual district.

There were four early water storage district procedures in the 1920's. The first was the Kern River W.S.D. covering lands served by the First Point rights on Kern River. The Buena Vista W.S.D. including lands served by the Second Point rights in the same river; the water storage district in the Tulare Lake Basin; and the San Joaquin water storage district including the lands served from the river by Miller and Lux and those planned to be served in the Madera I.D. were the other three. While the act was intended to be used on King s River, this area secured the passage of the Water Conservation District Act to meet their needs and proceeded later to use this act. Each of these districts is discussed separately later.

I made the following general reports to the State Engineer on the water storage district act procedure: "Policy in Passing on Feasibility," 8 pages, 1922; "Adoption and Carrying Out of Plan," 7 pages, 1924; "Basis of Voting," 10 pages, 1927; "Procedure of State Engineer," 32 pages, 1928.

Copies of thes reports were filed with the office of the State Engineer. Copies were also included in my bibliographical file, Item 33. These reports should be consulted for a complete discussion of the matters covered. The following comments touch a few of the matters involved.

Voting in water storage districts was on a property ownership basis. Each voter had one vote for each $100 of assessed land value on the county tax roll. Costs were to be distributed in accordance with the benefits received. It was expected that the amount of storage required by each canal system in a water storage district would vary inversely with the extent of its direct flow supply. This would result in variable benefits which could be equalized most effectively

by an assessment based on benefits rather than on land areas or values.

The areas expected to be included in the proposed water storage districts included large land ownerships. Some areas had only a limited number of local residents. The property qualification basis of voting gave all land owners a voice in proportion to their land interest in the district. Both the method of voting and the basis of assessment in the water storage district act are the same as those that had been used for many years in the reclamation districts formed to reclaim overflow lands where residents within the unreclaimed areas were lacking and where the size of the individual land ownership varied.

The property qualification for voting appeared to be simple to apply. All that would be needed would be to secure a copy of the last county assessment for the included lands. This part was lengthy but not complex. However, the next group of questions involved who would be entitled to cast the vote. Corporations could vote by resolution of their boards authorizing someone to cast their vote. Partnerships required agreement among all partners or a definition of the individual interest of each partner. Lands being purchased under contract on which title had not passed raised a question regarding who could cast their vote. This was usually handled by the seller giving a proxy to the buyer. Ownerships under guardianships, trusts, etc., presented additional problems. The matters were more involved in the areas seeking organization as water storage districts than they had been in the reclamation districts as the number of owners was larger and colonization had preceded the organization of the water storage districts.

To meet the district's financial needs until it could prepare and adopt a plan for its proposed work in which assessments could be

levied, the districts were given authority to levy a flat rate assessment not to exceed $.50 per acre. A second assessment of $.50 per acre could be levied if approved by the State Engineer. The receipts under this assessment could also be used to reimburse the sponsors of the district for their pre-organization costs.

As assessment based on benefits may be difficult to levy where many owners and variable degrees of benefit are involved. The water storage district act provides a board of three assessors to determine the assessment of each ownership. The report of the assessors is subject to equalization by the two executive directors under the water storage district act and the president of its district board. When it becomes final the levies by the district are expressed in terms of a percentage of the total benefits. This assessment is the one levied to distribute the estimated total cost of the district plan after such a plan has been prepared and adopted.

To assist the State Engineer in holding hearings, etc., the water storage district act provides for two appointed members to constitute a board of three. However, the board members do not have equal authority. The final responsibility rests with the State Engineer. The conduct of hearings can be assigned to the associate members. Mr. McClure usually asked the other two members to sit with him when he conducted hearings. The two associate members appointed under the act were W.P. Boone of Fresno and D. Joseph Coyne of Los Angeles. Mr. Boone was chairman of the King's River Water Association and Mr. Cloyne was an attorney practicing in Los Angeles.

The following discussion of water storage district procedure is applicable to the form of the act in effect up to and including 1928. It includes the amendments of 1927. My own active handling of these

procedures covered the period to 1928. Some changes have been made by later amendments to the act. Any present procedures should be based on the present form of the water storage district act.

The situations that rose in the State Engineer's administration in the 1920's of the water storage districts then before him can best be described by individual districts. While there were similar matters involved, each of these districts also had individual problems.

KERN RIVER WATER STORAGE DISTRICT

The history of this district to September 1, 1928, is covered in a report I made to the State Engineer on that date. This report is Item 2 in Binder 33 of my bibliographical file.

The Kern County Farm Bureau had been active in securing the investigations which resulted in Bulletin 9. It had been hoped that an adequate water supply was available for one large district including the lands which were served under both the First Points and Second Point rights and additional lands as well. My conclusion in Bulletin 9 was that the water supply was not adequate for a total area of more than 300,000 acres. Miller and Lux as the Second Point owners preferred to have a separate district. A petition was presented for a water storage district to use the First Point water under the recently enacted water storage district act. The hearings on the sufficiency of this petition extended through 1922. There were petitions for exclusion and for withdrawal of names that had been signed on the petition. The water storage district act had some uncertainties in its provisions. The Tejon Ranch, too, had wanted to have some of their lands included and fought the procedure for the proposed district. Mr. McClure's order approving the petition for organization was approved on July 20, 1923. This put into effect the procedure for the election on the organization.

This was the first election under the water storage district act. The vote was to be on a basis of a vote for each $100 of assessed value on the county assessment roll for land. This election was placed with the State Engineer. The State Engineer's office had not had any experience with the conduct of such elections.

As I had done the work on the hearings on the organization petitions and was familiar with the area of the proposed district and acquainted with those active in the organization procedure, I was assigned the job of conducting the election. It was also an entirely new experience for me.

The organization of this district had become controversial in the area. Under the property basis of voting, the Kern County Land Company had 46% of the votes, enough votes to carry the election. As they were in favor of the organization of the district, the election was sure to carry if it could be conducted so that it could not be successfully attacked on legal grounds.

This left me with the responsibility for avoiding any legal grounds for voiding the election in the face of known opposition by the attorney for the Tejon Ranch Company. I went to the County Clerk for help. He was very cordial, but explained that this election was political dynamite and he could not afford to take any active part in it. However, he offered to give me any informal advice he could and let me have a room from which to operate.

The voting list required the preparation of a list of owners and their assessed valuation. I employed a local title company to prepare this voting list. I had to segregate it by precincts, arrange the voters list alphabetically and assemble each voter's total vote when more than one piece of land was owned in a precinct. The area of the proposed district was about 250,000 acres. In spite of the dominant ownership of the Kern County Land Company, there were about 5,000 ownerships in the proposed district. Help was secured from Carlisle and Company of San Francisco on the form of the ballot, tally sheets, etc., which were printed by this company.

The Kern County Land Company did not campaign for the district as they had the votes needed to carry the election. There was organized opposition which had a free field to accuse anyone of anything. Although the State Engineer confined himself and his staff to their statutory duties under the act, he was accused of favoring the Land Company and other wrong actions. In the hopes of at least supplying correct factual information, I spoke to the joint meeting of the Bakersfield service clubs on October 26, 1923, discussing mainly the functions of the State Engineer under the water storage district act.

The election was held on November 10, 1923. This was a Saturday. The act called for the polls to be open from 7 a.m. to 6 p.m. on the day of the elction. I was at the courthouse in Bakersfield, available by telephone to answer questions that might arise regarding voting. Such questions kept coming in regarding who could vote , property having various complications of ownership. Some specific answer had to be given on the spot as the voter was waiting to have it decided. I made more judicial rulings in one day than a court would make in six months.

In the afternoon, a precinct near Wasco phoned in that many of their voters were Seventh Day Adventists and would not vote on Saturday until after 6 p.m. The polls were only scheduled to remain open then to 6 p.m. I told the election board to have the Adventists at the voting place before 6 p.m. and then to let them vote beginning at 6:01 p.m. under the provisions in the general election code that all voters at the polls at the time they closed were entitled to vote before the polls were finally closed.

The election carried by a vote of 68,465 to 21,929, an apparent

ratio of over 3 to 1. However, if the vote of the Kern County Land Company is deducted, the remaining vote was 10,222 for and 21,929 against, or a ratio against of 2.1 to 1. The total vote cast represented 73% of the eligible voters and 49% of the eligible vote of the voters other than the Land Company. Probably many small owners foresaw the result of the election and did not vote.

In 1924 a suit was filed contesting the legality of the organization of the district. This was filed after the six-month period allowed for filing such a suit had expired, and it failed. I attended the hearing on this suit with the applicable records, but was not called on to testify.

Thus ended an adventure on my part into a strange field outside of my previous experience. The work done was that prescribed by the statutes without fear or favor of either side. It was gratifying that the effort to overturn the election was not successful. I have always felt that it would have stood up even if the contest had been brought within the statutory period. As in all such matters, the experience I gained was mainly in a better understanding of human nature and what makes some people act the way they do. The conduct of this election was no place for anyone with a thin skin.

Following its organization, the Kern River Water Storage District appointed A.L. Trowbridge as its engineer and proceeded with the preparation of its district plan. This was not completed until 1928. A draft of the proposed plan was submitted informally to the State Engineer in advance of its official adoption by the district. I reviewed the advance draft in a memorandum dated October 27, 1928. In this memorandum, I had misinterpreted a portion of the district's

plan. When this came to the attention of the State Engineer, my memorandum of October 27, 1928, was recalled. My memorandum of December 10, 1928, is the corrected review of the proposed report of the district.

I made a report to the State Engineer dated September 1, 1928, covering the history of the Kern River water storage district to that date. This included the pre-organization record and the earlier part of the district's activity prior to the preparation of its plan.

Before the district plan had been completed, questions were raised regarding the application of the conflict-of-interest statutes to any purchase of the existing canal system by a district board of directors on which five of the seven members were employed by the Kern County Land Company whose systems were to be acquired. It was concluded that any such purchase would come within this statute and invalidate the purchase contract. The five Land Company directors resigned. Under the water storage district act, the State Engineer fills vacancies that occur between elections.

I was assigned the job of finding suitable and eligible successors. This required securing recommendations, interviewing prospective appointees, and, in some cases, trying to secure consent to be appointed and serve from some of the more desirable ones that had been recommended. There were 36 individuals specifically considered for these five appointments. Additional names were suggested but not investigated. The problem was to secure directors qualified to serve by their past business experience who were not, in some way, involved with the Land Company or committed to opposition to the plan. Small land owners who had opposed the organization of the district and were recognized as anti-district and anti-Land Company were not considered to be

suitable for these appointments. It was felt that the appointees should be capable of the business judgment required and neither strongly anti or pro district to an extent that would affect their conclusions on the proposed district plan.

I made a 22-page report to the State Engineer dated November 30, 1927, regarding "Appointments to Fill Vacancies on Board of Directors of Kern River Water Storage District". This report discussed both the criteria used in selecting recommended appointees and the individuals considered. It explained the reasons for not recommending some of those suggested and also for the selection of the five recommended appointees. The five recommended were appointed.

On August 24, 1928, the majority of the revised Board of Directors approved a report which it instructed the Chief Engineer of the District to prepare and file with the State Engineer. At the State Engineer's suggestion, this report was submitted informally in advance of the official filing in order that the State Engineer might have additional time for its review. This was done on October 19, 1928. A copy of this report had been loaned for examination prior to this date.

I was asked to review this proposed plan for the State Engineer. My report on "Proposed Report of the Kern River Water Storage District" was dated December 10, 1928.

In my report (31 pages) I discussed various features of the report and concluded that in its form it did not meet the requirements of Section 17 of the Water Storage District Act. Section 17 contains the specifications regarding the standards which a district plan report is required to meet. The specific points on which the proposed report was deficient were discussed in some detail in my

report. Revision of the proposed report before it was formally filed was recommended.

The objections made to the proposed district plan were largely based on its inadequacy for defining the individual land owners benefits resulting from the plan. The Water Storage District Act requires that the cost of the district works be assessed to the individual land areas in accordance with the benefits received. To enable such an assessment of benefits to be made on a basis which can stand up requires that the plan define the services to be received and their cost in specific and definite terms. It was my conclusion that this proposed plan did not meet this statutory standard.

The State Engineer transmitted a copy of my report to the District. Having been submitted informally, he did not need to reject it officially. He indicated that an acceptable plan would need to meet my objections.

The Kern River Water Storage District objected to my report of December 10, 1928, but did not take official action on it. On further consideration of its program the District decided not to proceed under the Water Storage District Act. The District was later dissolved.

My report of December 10, 1928, was my last extended work on this District. Events in the ensuing years have not altered the conclusions reached in 1928. Had the Kern River Water Storage District attempted to proceed under its 1928 proposed plan, in my opinion, difficulties and eventually litigation would have developed which would have hampered if not prevented its progress. The depression of the 1930's, while not a factor in my report, would have made successful progress additionally difficult.

When the Kern River Water Storage District was dissolved, the

Kern County Land Company brought rate cases to increase the rates for its public utility systems. Previously, the rate had been $0.75 per second foot per day. This was recognized as being below the cost of service. The Land Company was a major consumer under its own system. It did not seek a rate increase while the plan for a large district was under active effort. When this plan failed it sought rate relief.

The program proposed by the Kern River Water Storage District included drainage in the general south side area, transfer of excess use there to lands having an inadequate water supply north of Kern River and the regulation of Kern River by storage at Isabella. The Land Company secured a substantial increase in its utility rates. Some consumers south of the river abandoned their utility service and put in wells. This helped provide local drainage and released water for transfer to other areas. To this extent, the purposes of the District plan were accomplished.

When the 1936 Flood Control Act was passed and the Federal Government accepted the responsibility for flood control on a non-reimbursable basis, the Kern River situation was materially changed. In 1944 storage at Isabella was authorized as a flood control project. This storage has been built as a multipurpose project. Recently agreements have been reached on the costs allocated to irrigation.

The area north of Kern River under the Calloway and Lerdo Canals was later organized as the North Kern Water Storage District. It has contracted for much of the irrigation use of Isabella reservoir. General agreements have been reached on the operation of Isabella storage between the First and Second Point users and the lower rights including Tulare Lake.

Kern River has now reached what may be considered as the full development of its own water supply. Water is now being imported by the C.V.P. and will be imported by the State. The local ground water supply is generally in full use. Thus over more than forty years, the Kern River areas have accomplished their objective in the full use of their local water supplies.

Looking back, it is probable that the conditions on Kern River today would have been reached without the State investigation in 1920 and the lengthy water storage district procedure. The present results are the natural product of the physical conditions involved. They would have been reached by some process if the State had not participated in the 1920's.

The above conclusion, however, does not detract from the usefulness of the State's work in this area. While the same results might have been secured by other means, the State supplied the basic inventory of water supply and the area it could serve. It also, under the Water Storage District Act procedure, declined to approve a program of development that was not adequately prepared. To this extent, the State helped the area avoid a form of organization and a program that would probably have delayed the results that have now been accomplished.

It is my opinion that the activities and actions of the State Engineer in Kern River matters is an example of the proper functioning of this office. It cooperated with local agencies in investigating the resources and outlining their development. It acted in the public interest in declining to approve a plan inadequately worked out. In the 1920's, the State had no program of its own to affect its local actions and it could operate as a disinterested but informed agency.

BUENA VISTA WATER STORAGE DISTRICT

The Buena Vista Water Storage District was organized by the owners of the Second Point water rights on Kern River. Miller and Lux owned nearly all of these water rights and also nearly all of the lands which they served. Water was stored in Buena Vista Lake below Second Point. It was anticipated that the Second Point rights might participate in the storage then being proposed at Isabella. A district form of organization would be in a better position to finance such participation.

I made a report to the State Engineer dated July 1, 1928, entitled "History of Buena Vista Water Storage Project". I had handled all of the procedural matters relating to this district for the State Engineer and prepared this report to place these matters on record. A copy of this report and of other reports I have made relating to this district are in my bibliography file, Item 34.

The petition for the Buena Vista Water Storage District was filed August 9, 1922. It then included 125,890 acrea. In May, 1923, I made a report for the State Engineer on the "Feasibility of Proposed Buena Vista Water Storage District". I concluded that it was proposed to extend the available water supply over too large an area. Miller and Lux had agreed to give a preference in service to the lands south of Wasco Road with only flood water service to the lands north of this road. It was concluded that the service that would be secured by the lands north of Wasco Road would be insufficient to support their inclusion in a district. I found that the District as proposed did not meet a reasonable standard of feasibility, practicality and utility. My conclusion was supported by the State Engineer.

The recommendations in my May, 1923 report were not favorably received by the proponents of the District and matters were deadlocked until December, 1923, when Miller and Lux expressed a desire to find a basis which the State Engineer would approve.

There were two main points at issue. One was the adequacy of the available water supply for the areas it was proposed to serve. The second was the quality of much of the land proposed to be included north of Wasco Road.

On January 4, 1924, an inspection of these lands was made with T.P. Wittschen, attorney for Miller and Lux and J.F. Clyne, their superintendent. Mr. Clyne agreed on the ground that the alkali content of the lands I had questioned made them non-irrigable. Based on this advice from their own superintendent, Miller and Lux agreed to the exclusion of these lands.

Miller and Lux had constructed a relatively large canal north from Wasco Road to remove surplus waters from the Goose Lake area. This canal had only limited usefulness at best and would have had less if the lands north of Wasco Road were excluded from the District. Mr. J. Leroy Nickel had been mainly responsible for the expenditures on this canal. He was Henry Miller's son-in-law and had become president of Miller and Lux on Miller s death. Nickel was anxious to retain some land north of Wasco Road in the District to furnish an appearance of usefulness for the canal. Largely to save face for him in this matter a row of sections in King's County at the north end of this canal were allowed to remain in the District. These lands were of suitable quality. They were included in the District as organized. Later, Miller and Lux recognized the difficulty of serving this isolated area and these lands were withdrawn from the District.

The concession relating to these King's County lands resulted in the consent of Miller and Lux to the exclusion of the other lands north of Wasco Road. The organization of the amended District was approved by the State Engineer. Its organization election on June 28, 1924, carried with no opposing vote.

The District was not active in the earlier period after its organization as it waited to see what plans might be worked out for a joint storage with the Kern River Water Storage District. In 1925, there was a change in the control of Miller and Lux resulting from its refinancing of its own indebtedness. Mr. James Fickett became manager and began the sale of Miller and Lux lands. This refinancing was more directly related to the San Joaquin River Water Storage District and is discussed in the comments on that district. In order to make its lands in the Buena Vista Water Storage District more readily saleable, it was essential that the irrigation system be in the ownership of some form of District organization. W.C. Hammatt prepared a valuation of the properties the District proposed to acquire. His report was dated September 6, 1926.

Hammatt's valuation was based on the usual estimated cost of reproduction of the works to be acquired. Miller and Lux had built large flood discharge canals which were also used for irrigation. The yardage in these canals at reasonable costs per cubic yard resulted in a relatively high cost per acre for the lands in the District.

As the water supply was subject to deficiencies, I reported to Paul Bailey, the State Engineer, that the system to be bought did not, in my opinion, have a value to the land of over $25 per acre. Bailey accepted this recommendation. The District was advised that this would be as large a bond issue for the purchase of

these works as the State would approve.

This result was accepted by the District and the purchase price was reduced to this basis. As Miller and Lux owned about 90% of the land and the irrigation system, this was largely a matter of bookkeeping for them. The lower bond issue made the lands more readily saleable at some increase in land price.

Miller and Lux were also required to transfer title to the water rights to the district. This was finally done on a basis accepted by Attorney General U.S. Webb. The plan was approved, the election on its adoption carried unanimously and the district took over the irrigation system.

The original directors of the Buena Vista Water Storage District were Miller and Lux employees. These resigned and were replaced by others before the purchase of the irrigation system. The same procedure was used here as in the Kern River Water Storage District. I canvassed the available appointees and made recommendations regarding the appointments to be made. These were followed.

The next procedure relating to the Buenz Vista Water Storage District was the certification of its bonds. The amount was $942,000 on 50,400 acres of land to be assessed. The area in Buena Vista Lake was included in the District, but was not to receive water and was not assessed. I made a report on this bond issue for the State Engineer in June, 1929. Mr. Edward Hyatt was the State Engineer at this time.

The Miller and Lux lands in the Buena Vista Water Storage District were included in the general trust deed securing the two issues of mortgage bonds on the Miller and Lux properties. It was necessary to secure waivers of this mortgage to give a prior lien to the District

bonds. My report recommended certification of the District bonds subject to the completion of these waivers. The waivers were secured and the bonds certified.

Miller and Lux retained the District bonds which it received in payment for the irrigation system sold to the District. Miller and Lux paid most of the taxes in the earlier years of the District. They received mainly their own money back as interest on the bonds.

In 1935, Miller and Lux arranged to sell the District bonds it held through Stone and Youngberg, a bond firm in San Francisco. I was asked to prepare a report on these bonds by Stone and Youngberg. My report was dated April, 1935. A copy is in my bibliography file. It is report 2 in Item 34. This report was favorable.

After making my April, 1935 report on the bonds, there were some changes made in the lease of lands in Buena Vista Lake suggested by the legal advisors of the bond dealers. To include these changes, I made a supplemental report in July, 1936. This report was made for two of the Los Angeles bond firms who were selling the bonds there for Stone and Youngberg. This report is also in my bibliography file. It is No. 1 in Item 34.

The July, 1936, report on its bond issue was my last work on the Buena Vista Water Storage District. In the ensuing years, the District has operated successfully, has met its bond payments and has joined in the general Kern River agreement relating to storage at Isabella. It is now (August, 1965) considering purchasing additional water from the State project. It is understood that no final decision on such a purchase has been made at this time.

Among the more controversial matters relating to the Buena Vista Water Storage District was the refusal of the State Engineer

to approve the inclusion of lands north of Wasco Road. This refusal was based both on a lack of adequate water supply and the poor quality of the trough lands in this area. Even if the water supply had been adequate these lands were not considered to be susceptible of irrigation under a practical standard in which the land would need to be susceptible of producing crops which could meet the costs of its irrigation. The poorer of thes lands were of the type described as "self-rising" in which the alkali, largely black alkali type, results in a loose, puffy surface. I have seen no reason to change my conclusions in the years since the exclusion of these lands was made.

To the east of Buena Vista Water Storage District, the Semitropic Ridge includes lands of somewhat higher elevation on which some areas have been reclaimed by the application of gypsum. These lands are not, in my opinion, comparable with the excluded trough lands north of Wasco Road.

In 1956, when the State water project appeared to be a reality, a District was proposed covering the Semitropic Ridge and adjacent areas. This district extended north of Wasco Road and included lands that had been excluded from the Buena Vista Water Storage District. A petition for the organization of the Semitropic Water Storage District was filed on April 28, 1958. A report on this proposed district was prepared by the Department of Water Resources in June, 1958. This was published by the Department as "Report on Proposed Semitropic Water Storage District".

About 225,000 acres were included in the proposed district. The State's land classification is stated to have been made in "considerable detail" (p.52). "All but about 1,400 of the 224,000

acres within the proposed district are susceptible of irrigated agricultural development . The 1,400 acres considered to be non-irrigable consist mainly of small stream channels. About 12,000 acres of the irrigable lands are of excellent quality and will produce a wide range of climatically adapted crops. Some 166,000 acres although having adequate soil depths, are limited in their crop adaptability and productivity by excesses of soluble salts and exchangeable sodium. The remaining 45,000 acres, in addition to being affected by salts, also have shallow soil depths or very fine textures". (p.53)

The report continues (p.53-4), "The degree to which the saline and alkali lands are affected by concentrations of salts varies from slight to very heavy. Conditions are such that some could be brought into production rather easily, while other areas would require extensive reclamation to make them productive. The more adversely affected lands would require large quantities of amendments and water for leaching purposes. In the areas of finer textured soils, very little crop production could be expected for several years. It is doubtful if any of these seriously affected lands would ever be reclaimed beyond a point where they would produce any but medium or shallow-rooted crops".

The report discusses the reclamation of these alkali lands by the addition of gypsum and leaching. One acre foot of water was estimated as the amount of water required to dissolve and to make effective one ton of the calcium-carrying amendment (p.56). A total of 608 soil samples were analysed and the tons per acre of gypsum required to reclaim the top two feet of soil were computed. Twenty-eight individual categories, ranging from five to fifty-one tons of gypsum required

were used. The average requirement was found to be 24 tons per acre with a total of 4,400,000 tons for the entire area (p.57). An acre of 63,850 acres was found to require thirty or more tons per area of gypsum (p.59). It was estimated that 195,970 acres would ultimately be irrigated (p.62). This is about 88% of the gross area.

A concrete pipe conveyance and distribution system was planned at an estimated cost of about $50,000,000 (p.78). This is about $240 per acre. Total annual costs were estimated to be $13 per acre for the distribution system (p.79).

Under "Land Reclamation" (p.81), is the following statement:

"Physically, practically all of the lands in the proposed district appear to reclaimable, although the time required and cost will vary considerably. Profitable levels of production have been reached in from three to five years on the lands developed in recent years, but five years or longer may be needed before this level is reached in the more seriously affected areas and on the lands having less desirable physical characteristics."

The average cost of reclaiming the alkali lands was estimated to be $750 per acre including an average cost of $250 per acre for the raw land (p.83) and $150 per acre for crop losses during the period of reclamation.

The report recognizes that "reclamation and land development involves a sizeable investment". (p.83). However, other factors are mentioned, such as income tax deductions for annually recurring costs associated with reclamation, and through cost sharing under the Agricultural Conservation Program (p.84); market values for developed land, as then understood, were $500 to $1,000 per acre.

Payment capacities for water were estimated on the basis of the

average crop yields in Kern County as shown by the reports of the County Agricultural Commissioner. For V and VS lands comprising 81% of the district, the payment capacity was estimated to be $21.00 per acre foot. For the poorer Vhs, Vls and Vps lands, the estimated payment capacity was $15.00 per acre (p.88). Deducting $5.25 per acre foot for the cost of distribution leaves $9.75 to $15.75 per acre foot payment capacity at delivery from the State canal. The district average would be $14.75 per acre foot (p.89).

At the time this report was prepared, the cost of state water had not been announced. It was thought that this price would be within the payment capacity and the report concluded that the district project was feasible (p.89).

"It is, therefore, indicated that the proposed project, so far as it can be defined at the present time, possesses this essential element of feasibility . June 30, 1958" (p.94).

The maps included in report show the irrigated area in 1956. These lands were in the eastern part of the district. Only a minor area was shown just north of Wasco Road in the area rejected for inclusion in the Buena Vista Water Storage District. The land classification map shows the lands rejected for the Buena Vista Water Storage District as having limited crop adaptability due to salts and either fine texture or shallow depth. The map showing the estimated gypsum requirements shows these lands generally in the one to fourteen tons per acre. The largest requirements, thirty tons or more, are mainly in the northern part of the District.

In its Bulletin No.119-8, dated September, 1963, the Department of Water Resources estimated that the water toll, per acre foot at the California Aqueduct near Tupman where the Semitropic Water Storage

would receive its supply, will vary from $10.00 in 1968 to $12.00 in 1990. Adding the estimated $5.25 per acre foot cost of distribution gives an average cost at the farm delivery of $15.25 per acre foot in 1968. This estimated cost can be compared with the the estimated payment capacity in the 1958 report of $21.00 per acre foot for the better lands and $15.00 for the poorer lands. The average ability to pay for the entire Semitropic Water Storage District exceeds the estimated cost of state water, but the estimated costs exceed the ability to pay of about 20% of the district land.

This extended review of the Semitropic Water Storage District has been made in an effort to see what support might be presented for the reversal of the 1928 conclusions regarding the feasibility of the irrigation of the trough lands north of Wasco Road. These lands were rejected in 1928 for inclusion in a district which would have a relatively low cost of water. In 1958, they were found to be feasible for inclusion in the high cost Semitropic Water Storage District.

These lands have not changed materially in the thirty years between these two results. Some advances have been made in alkali amendments although the costs of such reclamation may exceed the value of the reclaimed land.

It is still my opinion that the action in 1928 was justified and that it was in the interests of the Buena Vista Water Storage District to have these lands excluded. It is also still my position that the best interests of the better lands in the Semitropic Water Storage District will be served by the exclusion from its area of the low quality land now in its boundaries including the trough lands north of Wasco Road.

SAN JOAQUIN RIVER WATER STORAGE DISTRICT

This District included the areas in the Madera Irrigation District and the Miller and Lux areas served from the San Joaquin River. This account includes the earlier work I had done relating to the Madera Irrigation District prior to the water storage district work as well as the later San Joaquin River Water Storage District.

My first work relating to the Madera area was the preparation of a "Preliminary Office Report on the Possibilities of Forming an Irrigation District in Madera County, California", dated January 11, 1916. This report was prepared for the irrigation investigations of the U.S.D.A. It discussed generally the lands, water supply and irrigation system relating to such a district. It was prepared for use by a local committee considering the organization of such a district. An irrigation district containing about 350,000 acres was organized in 1920. In 1921, this district voted $28,000,000 in bonds to construct storage on the San Joaquin River at Millerton (now Friant).

Storage on the San Joaquin River required the determination of the prior appropriations and the riparian rights on the river. Efforts to reach such a determination resulted in an agreement to organize a water storage district to included both the Madera I.D. and other lands served by diversions from the San Joaquin River.

Prior to this agreement a petition had been presented for the organization of the San Joaquin Water Storage District, including about 550,000 acres under the Miller and Lux canals. This was protested by the Madera I.D. When the compromise was worked out, the San Joaquin Water Storage District procedure was dropped and the San Joaquin River Water Storage District was started.

The petition for the larger district was filed on January 18, 1923. The engineering studies were actively undertaken by W.C. Hammatt for Miller and Lux, Harry Barnes for the Madera I.D. and myself for the State Engineer.

The proposed district included about 950,000 acres. The boundaries had been drawn in accordance with the compromise agreement and included much poor land. The poor lands were generally of two classes, a shallow hardpan area in the eastern portion of the Madera I.D. and the Miller and Lux grass lands or swamp pasture areas.

The Water Storage District Acts required the State Engineer, in approving the petition for the organization or a water storage district, to certify that the lands to be included were susceptible of irrigation from a common source. This requirement was interpreted by Mr. McClure, the State Engineer, to mean more than physical susceptibility of being irrigated from the common source. He considered that "susceptible" meant economically susceptible, and that the lands on which the District supply would be used had to be capable of producing crops which would meet the costs.

I prepared two reports on the history of the San Joaquin River Water Storage District. One was a summary of this history to July 1, 1928. A copy of this is No. 6 of Item 37 of my bibliography file. A more complete report was entitled "Records of the Relation of the State Engineer's Office to the San Joaquin River Water Storage District". This is No. 7 in Item 37. It consists of three parts. Part I covers matters prior to organization; Part II from organization to presentation of Plan of May 25, 1925: and Part III from "Abandonment of Plan of May 22, 1925 to Reorganization of Board of Directors, September 7, 1926, with General Items to July 1, 1928".

These reports describe the procedure relating to the District and the conflicts between the State Engineer's interpretation of his responsibilities under the Water Storage District Act. It is not necessary to repeat all of this history here. Basically, the District took the position that the authority of the State Engineer was limited to checking names on the petition and other routine items without discretionary authority to modify the proposed boundaries or to pass on the merits of the proposed plan. At the first hearing on the petition, for the San Joaquin Water Storage District, Edward Treadwell, the attorney for Miller and Lux, became quite emphatic in his accusations regarding the position of the State Engineer. Mr. McClure maintained his position and dignity. Later, representatives of Miller and Lux apologized for Mr. Treadwell's conduct. Milton Farmer, who was the attorney for the Madera I.D. and later for the San Joaquin River Water Storage District, also tried to coerce Mr. McClure to change his position. This did not work either. I was in the middle of these controversies supplying Mr. McClure with the supporting material for his position.

When I first began to work for Mr. McClure, I was told that I might not be able to count on his staying with a position under attack. I have seen him tested many times in the controversies relating to the water storage district procedure. He never gave way under any of these attacks and always supported me in any actions I took which he had approved. It was a pleasure to take part in these matters with this kind of support.

When the State Engineer had advised the San Joaquin Water Storage District that he would not approve the organization of the District as proposed because of the inclusion of poor lands, there was

a heated reaction which gradually cooled off. Later, the District proposed that a board of three should be appointed to revise the boundaries. This was to consist of Mr. Hammatt for Miller and Lux, Harry Barnes for the Madera I.D. and myself for the State Engineer, Mr. McClure agreed to such a board. However, after the agreement had been made, the District set a thirty-day limit on the completion of the land classification. I declined to be bound by this time limit and Hammatt and Barnes proceeded, Hammatt covering the Miller and Lux lands and Barnes the Madera I.D. area. Later, I reviewed their results and we agreed on a revised district boundary.

When this board was proposed and Mr. McClure had named me to represent him, Mr. Nickel of Miller and Lux proposed that he should also name me to represent them in order to save the expense of the third man. Mr. McClure pointed out the reasons why this would not be proper; if he had not, I would have declined the double duty.

When it had been agreed that the boundaries should be revised, Mr. Nickel wanted the board to start immediately. Mr. Hammatt explained that he was committed getting married the next week and taking a two-week honeymoon. Mr. Nickel commented that it only took one day to get married and this was no excuse for delay. Mr. Hammatt took his honeymoon. This remark had particular interest coming from Mr. Nickel, as the one day in his life which determined his whole future was the day he married Henry Miller's daughter.

The area in the San Joaquin River Water Storage District as first proposed was about 933,000 acres. About 382,000 acres were excluded. This reduced the Madera I.D. area included in the Water Storage District to about 200,000 from 375,000 acres. The remainder

was nearly all the exclusion of what were called the Miller and Lux grass lands. This term was used to distinguish these lands from the cropped lands. These grass lands were generally on the areas subject to overflow from the San Joaquin River or from canals. They received whatever water might be available in excess of the demands of the crop lands. The grass lands had not been levelled and were flooded to the depths needed to submerge their areas. The forage produced was usually of poor quality and low value.

In November, 1923, I prepared a report on "Feasibility of Proposed San Joaquin River Water Storage District". This was prepared for the State Engineer in compliance with Section 5 of the Water Storage District Act. A copy of this report is Item 35 in my bibliography file.

In this report, I found the proposed district of 933,000 acres not to be feasible. At the time this report was made the revision of the boundaries had been completed. I found that the resulting 550,000 acre district was feasible if adequate agreements could be reached on matters of values and water rights and recommended its approval for organization.

The next question was how to exclude lands that were included in the organization petition. There was no question regarding the authority of the State Engineer to exclude lands if the owner petitioned for exclusion. Securing such petitions from all of the owners of the lands to be excluded was recognized as impractical. Abandoning this district and starting a new district also meant delay and costs.

The lawyers finally agreed that an exclusion by the State Engineer without petition by the owner would stand if the owner did not protest prior to the District's organization. This was done. No

excluded owner protested. The District went to the organization election with the reduced area. The election carried and was not contested.

Following its organization, the District established its office in Los Banos, appointed Harry Barnes its engineer and Milton Farmer its attorney. Although the nine District directors divisions had been adjusted to give Miller and Lux four directors and the other land owners four with the ninth selected by the other eight, Miller and Lux took over the direction of District policy and action.

The preparation of a District plan was undertaken. In April, 1924, the State Engineer had advised the District that, in his opinion, the water storage district act required that a district plan be based on determined prices for works to be purchased rather than on estimates of what the cost of works to be purchased might be.

In 1925, the District made available to the State Engineer the material it planned to use in its district plan and asked for comments regarding its adequacy. A brief review of this material was made in April, 1925. This indicated that the District did not have the material necessary to complete an adequate plan and the District was so advised. The District, however, attempted to present a plan dated May 22, 1925. This plan was authorized to be submitted by Resolution No.76 of the District board and to be filed in compliance with Section 17 of the California Water Storage District Act.

The May 22, 1925, plan was so obviously faulty in its omissions, inconsistencies and infeasible costs for some areas that it was rejected by the State Engineer. The District threatened action by attempting to secure a writ of mandate to force its acceptance. No legal action, however, was taken.

In rejecting the May 22, 1925, plan, Mr. McClure offered to have me

review the plan in detail and to point out its defects. This offer was accepted and resulted in my report of September 1, 1925, on the "Proposed Plan of the San Joaquin River Water Storage District as Submitted Informally to the State Engineer by Resolution No. 76 of the Board of Directors of the San Joaquin River Water Storage District". This is Item 37a of my bibliography file. This report reviewed the details of the proposed plan.

It was my conclusion, as expressed in the September 1, 1925, report, that the proposed plan lacked the required essentials of a statutory plan. Its defects would require correction before the requirements of the Storage District Act could be met. It was also concluded that if a proper plan were completed based on the appraisals used in the proposed plan, it would result in an infeasible project. The statement was made, "If matters of water rights are adjusted equitably and if existing properties can be acquired at a price representing their reasonable value, this project is feasible. The general nature of the adjustments required and the costs are discussed at length in the report".

My report contained 167 pages. This length enabled the proposed plan to be discussed in detail.

Efforts to reach an equitable adjustment of the various issues involved outside of litigation were urged. For such a large and involved project, only a plan prepared with the full understanding and approval of the conflicting interest could expect to succeed.

Prior to the completion of my report of September 1, 1925, there were discussions and correspondence between the District and the State Engineer. The State Engineer returned the proposed plan to the District. It had been submitted informally and McClure wanted to avoid

any later claims that the sixty-day period for his review was running. On June 5, 1925, the District board voted to recall the May 22 plan and accepted Mr. McClure's offer of cooperation.

The details of the actions relating to the May 22, 1925, proposed plan are included in my report of July 1, 1928, Part II on the relations of the State Engineer to the District.

Much of the controversy over the proposed plan related to the appraisal of the Miller and Lux properties to be acquired by the District. The District employed A. Kempkey to participate in these negotiations for them and Miller and Lux employed Fred H. Tibbetts to represent them. Mr. Nickel insisted that these two reach an agreement on a purchase price. Such an agreement was reached.

The proposed plan had a total estimated cost of $31,500,000. This was about equally divided between the purchase of existing works and water rights and the construction of new works. The purchase of properties was divided nearly $10,000,000 for water rights and nearly $6,000,000 for physical properties.

As a result of the objections to the proposed price of the Miller and Lux properties, the District appointed a board of review consisting of Messrs. Haehl, Hermann and Etcheverry to report on these prices. The District attempted to make it appear that the selection of the members of this board had been approved by Mr. McClure. The details of this matter are contained in Part III of my July 1, 1928, report (Part III, No. 7 in Item 37 of my bibliography file).

After the rejection of the May 22, 1925, proposed plan, when it was planned that an effort would be made to prepare an acceptable plan, it was recognized that such a plan would require the withdrawal of the Miller and Lux members of the District board. This was necessary

to avoid the conflict of interest statute.

This was a similar situation to that which had arisen previously in the Kern River Water Storage Project. It was similarly handled. The Miller and Lux directors resigned, I drew the job of finding their successors and my recommendations were appointed.

A factor in the prodeedings relating to the San Joaquin River Storage District was the financial position of Miller and Lux. When Henry Miller died in 1916, Miller and Lux had no mortgage debt. His inheritance taxes were about $4,000,000. This was borrowed. J. Leroy Nickel replaced Henry Miller as president of Miller and Lux and attempted to operate the properties. These operations resulted in further borrowing and by 1925, the indebtedness had increased to about $15,000,000. If the District plan had gone through, Miller and Lux would have received sufficient payment for the properties to be sold to the District to have placed them in a much improved position. When the plan for the District was not approved Miller and Lux negotiated two mortgage loans. These were in the form of bonds sold to the public. One was for $15,000,000 secured by their California lands and the other was for $10,000,000 secured by their water rights and their lands in other states. These issues were approved by the Superintendent of Banks, although I had recommended that they should include a provision that if bonds were issued for which these lands were the security, when any of these lands were sold, the land bond should be retired, in an equal amount. This was unacceptable to those handling the Miller and Lux bond issue and was not required by the Superintendent of Banks.

The Miller and Lux bond issues included a provision that representation of the bond holders should have a majority on the Miller

and Lux board of directors. This was done and the liquidation of Miller and Lux properties to pay off the bond issues was begun. James Fickett was placed in charge of this program. Eventually enough properties were sold to retire these bond issues. Miller and Lux still had substantial assets left after payment of these loans.

A recent aftermath of the partial liquidation of the Miller and Lux properties has been the litigation among the present generation heirs over claimed fraud in sales which were made. The story of this litigation is outside of this account of the San Joaquin River Water Storage District and is available in the court records. It resulted in financial settlements and a very large legal fee to the attorney who worked up the case. My only comment is that I worked with Judge Woolley, then attorney for Miller and Lux, during the District procedures. In my opinion, if there were improper actions taken in selling Miller and Lux lands to favored buyers at too low prices, it was done without participation by Judge Woolley. Judge Woolley was a director of Miller and Lux during the period of these sales.

Following the rejection of its proposed plan in 1926, the District continued some activity until 1929, when its board of directors resolved to request the attorney-general to bring dissolution proceedings. Provision for such action is included in the Water Storage District Act. This was done and the District was dissolved. Thus ended an unsuccessful effort to develop storage on the San Joaquin River by a local organization for use on lands served from the River or the adjacent lands.

The organization of the Madera Irrigation District had been maintained during the Water Storage District activities. When the Storage District was dissolved, the District resumed its efforts to secure water for its area.

The State Engineer had been subject to extensive criticism for the position he had taken on the acceptance of the proposed plan of the San Joaquin River Water Storage District. As I was the author of the reports on which such actions were based, I had to meet similar attacks. It was then my opinion that the position taken was in accord with the terms of the Water Storage District Act and in the public interest. I have seen no reason to change this opinion in the forty years since these actions were taken.

While the actions of the State Engineer on the District plan were unpopular in the 1920's, the attitude within the District area changed in the depression of the 1930's. If the proposed plan had been carried out in the 1920's, the District would have been subject to the same financial conditions which caused defaults in so many California irrigation districts having similar bond changes to meet. During the 1930's, some of the more active opponents of the State Engineer's action in the 1920's expressed their thanks for such actions which had prevented the proposed plan from being completed. The actions taken in the 1920's were based entirely on the then conditions without foresight regarding what occurred in the 1930's. These actions were supported by the conditions in the 1920's alone. Looking back now, they are additionally justified.

If the proposed plan of the San Joaquin Water Storage District

had been carried out, the conditions which the Central Valley Project would have had to meet would have been more difficult to work out. The grass land water rights would have been in use on crop lands and not available for purchase. Additional exchange water would have had to be pumped from the Delta. Storage at Friant would have been needed with a larger capacity than the San Joaquin River Water Storage District would have constructed. Enlargement of this storage would have been more complex than original construction.

Miller and Lux has sold its San Joaquin and King's River Canal System to a recently organized irrigation district in its area. The C. V. P. exhange agreement gives Miller and Lux a more favorable water supply than they had previously. The Madera I.D. area is now served by the C. V. P. under terms more favorable than it could have secured as a separate district financed by its own bonds.

The present conditions in the former area of the San Joaquin Water Storage District are all more favorable than they would have been if the proposed plan of the 1920's had been carried out. It is still my opinion that the actions of the State Engineer in the 1920's represents a realistic and courageous facing of the responsibilities of the State Engineer as then defined by statute.

My work on the San Joaquin River Water Storage District also brought me into contact with the general affairs of Miller and Lux. Some comments on their mortgage bond results have already been made, as it had relationship to District matters. Some of the items of bearing on the District include the following. These may have some general interest.

Edward Treadwell was the attorney for Miller and Lux prior to the death of Henry Miller. His employment was under an annual contract for his services. When Henry Miller died, Treadwell handled the inheritance tax procedure for the estate. After this matter had been completed, Treadwell submitted a bill for his services to the estate. Payment was refused on the ground that his services came within his annual contract with Miller and Lux. Treadwell brought suit and won. As I remember it, the fee was $300,000. The inheritance tax was about $4,000,000. It was reported that the jury expressed regret that Treadwell had only sued for $300,000; they would have like to have given him more. This reflects the attitude then prevailing toward Miller and Lux. Mr. Treadwell was replaced at this time as attorney for Miller and Lux.

Another indication of the difficulty of Miller and Lux securing impartial juries is shown by their experience with cattle rustlers. Killing a Miller and Lux steer for meat was not locally considered to be a crime. When such rustlers were caught, convictions by jury trial were almost impossible to secure. Miller and Lux are reported to have adopted the practice of prosecuting for trespass and securing injunctions against the individuals accused from further trespass on Miller and Lux lands. This gave the accused individuals one free offense, but placed any later offenses within the discretion of the judge for contempt of court without jury trial.

Henry Miller had a rule that no one should be refused food at his camps. Those seeking meals were required to wait until the employees had eaten when they could eat second table. As they ate off the dishes of the first table, the Miller and Lux camps came to

be known as the Dirty Plate Route. The Miller and Lux lands were sufficiently extensive that a tramp could almost eat his way the length of the San Joaquin Valley.

In the 1920's, I worked on a case involving the Montague Water Conservation District vs. Duke, tried at Yreka. Duke was a very interesting character of the pioneer type. He claimed to have been Henry Miller's body guard for many years. I do not know the actual history of such services by Mr. Duke, but the story lost nothing in his telling of his experiences. Duke was raising Hereford bulls at the time of the Montague case.

Treadwell wrote a biography of Henry Miller entitled "The Cattle King," published in 1931 by the MacMillan Company. Treadwell called this a dramatized biography. It is well-written and gives a good insight into the character of Henry Miller and his accumulation of the vast Miller and Lux properties. This was written after Treadwell's litigation with the heirs. It is evident that this later controversy did not affect Treadwell's admiration for his former employer.

TULARE LAKE BASIN WATER STORAGE DISTRICT

This material relates to the above named district through its organization period when my contacts with it were based on my work for the State Engineer in his procedure under the Water Storage District Act. These matters were internal to this district.

Later matters in which I represented the Tulare Lake Basin Water Storage District in procedures relating to its four tributary streams are discussed separately later.

A petition for the organization of the Tulare Lake Water Storage District was filed on August 30, 1923. Hearings were held, the petition approved and an election on organization was held October 10, 1924. This District proposed to regulate the inflow to Tulare Lake in a sump reservoir within the lake area. About 175,000 acres were included in this District.

There had been conflicts of interest among some of the larger land interests in the Tulare Lake area. After the Tulare Lake Water Storage District was organized these conflicts were compromised and an agreement to organize a larger water storage district in the lake area was reached. The Tulare Lake Water Storage District was dissolved by court order on July 29, 1927.

The petition for the enlarged Tulare Lake Basin Water Storage District was filed on October 7, 1925. A plan filed April 20, 1927, by the new district was rejected for lack of a definite basis of benefits and other details (Bull. 21, p. 381).

This first plan was revised, filed, accepted and proceeded to assessment in 1928. I was one of the three assessors. The other two were George A. Atherton of Stockton and Stanley Abel, a supervisor in Kern County. There were no protests at the equalization

hearing and the assessment became official.

One of the terms in the lake agreement on which the organization of the Tulare Lake Basin Water Storage District was based was that there should be eleven directors divided as specified among the various interests. The State Engineer considered this number to be too large to be desirable but accepted it. It was considered that the advantages of the agreement outweighed the unwieldiness of the Board.

The plan involved purchase of land in the lower lake area for use as a reservoir. An option to purchase this township (1/2 fee and 1/2 easement) was completed prior to the adoption of the plan. As no such purchases recurred after the organization of the district, it was not considered that the conflict of interest statutes applied. The selling interests were represented on the compromise board.

There were some points of difference between the State Engineer and the proponents of this district in the organization procedure. These were worked out by agreement. Among these were actions on petitions for inclusion and exclusion. Some boundary changes were made from those contained in the petition.

In my work for Mr. McClure on the Tulare Lake Basin Water Storage District, I received the same full support that I received in all other matters. Following Mr. McClure's death on June 22, 1926, Paul Bailey became State Engineer for a short period. Bailey would meet with the proponents of the district and agree to actions without advising me of the results. Where such actions represented changes in policy, I found myself trying to enforce action which had been rescinded. This difficulty was removed when Edward Hyatt became State Engineer. I was on the point of quitting when this change occurred. As the proponents of the district were paying for my

services for the State Engineer (as provided in the Water Storage District Act) and as I had already done most of the organizational engineering, I tried to stick it out and did.

The record of all of the procedure relating to these two districts was filed in the office of the State Engineer. When I retired from work for the District in 1953, I turned over to the district my correspondence and other pertinent materials. I also gave Stanley Barnes of J.G. Boswell and Company copies of nearly all of the reports I had made, including those relating to its early procedure. Any detail items that may be needed should be found in these sources. Boswell and Company is now the largest land owner in the Lake.

Tulare Lake has had a long story in its reclamation. As early as diversions from its tributary streams began to diminish its inflow, reclamation around its margins began. This area was subject to wide variations in its inflow with similar wide variations in its area and crop opportunity. By the time of the organization of the water storage district, the average inflow had been reduced to a point where submergence of crop land could be controlled except in years of excessive stream flow. The incentive behind the organization of the storage district was the desire to improve the frequency and extent to which these lands could be cropped.

Early reclamation in Tulare Lake involved large risks and, when successful, large profits. This situation attracted individuals willing and able to take such chances for the chance that such profits could be made. Recognizing these conditions, they accepted the results when losses occurred.

Reclamation in Tulare Lake was not practical on small areas. This necessarily led to the ownership of large tracts. Residence

in Tulare Lake was also not practical in the early years due to the danger of becoming flooded. Equipment could be moved in and out but home improvements were not safe. The lack of underground water supply for domestic use was, and still is, a deterrent to local settlement.

Early crops were mainly grain. This could be seeded in the fall and in some years harvested before the heavier runoff of the succeeding year. Much grain was lost by submergence before it could be harvested. Crops were "mudded in" as the water receded being planted in the exposed areas and grown by the moisture retained from the preceding submergence. Only annual crops were suited to these conditions.

The conditions in Tulare Lake required operators able to make decisions quickly. Word might be received that inflow was on the way. An immediate decision on whether to try to hold the levee, to abandon the area or to try to harvest ahead of the rising water had to be made without reference to some committee for debate. These conditions naturally attracted individuals able to operate under these conditions. They were a hardy group that had the pioneer spirit and the pioneer opposition to restraint by others.

The independence in their own operations resulted in the conflicts that arose in the lake. If another levee broke first, it might supply sufficient outlet that your own levee could be held. There are stories of breaks that may have been aided by competing interests. It is difficult to determine how much of this is now folklore and how much is fact. Placing guards on levees was practiced both for watching the water and to avoid trespass by others.

No history of Tulare Lake would be complete without mentioning A.D. Schindler. Mr. Schindler had been an engineer for the Santa Fe Railroad and had become acquainted with Tulare Lake in his work on

their line in the valley. He left the railroad and secured backing for the development of lands in the Tulare Lake Basin. This backing was from a group which came to be known locally as the Santa Fe crowd. The King's County Development Company was formed and acquired lands in the lake largely in its northeast portion.

Schindler was a good operator. He developed the early plans for the lake and undertook to carry them out. Others were also active in other portions of the lake. However, during the organization period, Schindler was recognized as the general leader.

Like similar pioneers, Schindler had his own ideas and was used to having his own way. In the organization of the District, various differences with the requirements of the State occurred. I represented the State Engineer and handled the detailed contacts with the proponents of the District. These included various sessions with Schindler, some of which reached the table thumping stage. No matter how emphatic he might become, Schindler was never personally abusive. I regard our acquaintance and I think our friendship as one of my valuable experiences.

Early engineers working in the lake area included Max Enderlein and Harmon Bonte. Roy May came a little later. Enderlein wore out an auto showing the engineers of the State Reclamation Board over the lake area in 1916 and was appointed as a member of the Board of Assessors for the Board in assessing benefits for their projects in the Sacramento Valley. Etcheverry and Hermann were the other two members and dominated the Board. Bonte, in later years, was with the Irrigation District Securities Commission and Stone and Youngberg. Roy May was County Engineer of King's County as well as engineer of the Tulare Lake Basin Water Storage District at the time of his

death on January 19, 1947.

In my later work for the Tulare Lake Basin Water Storage District, I prepared a history of the water supply of Tulare Lake. This included what I could assemble on its past fluctuations and conditions. It is entitled,"Inflow to Tulare Lake from its Tributary Streams," August, 1949. It summarized the available records and reports with estimates of the inflow from 1850 to date (129 pages). It is Item 84 in my bibliographical file.

The Tulare Lake Basin Water Storage District made some payments on its purchase of the sump lands and then allowed them to revert to their former owners. The district has operated to represent the lake area in its negotiations with the water rights on King's River and its other tributaries. Its early plan has been superseded by later programs based on the storage that has been built on its four tributaries.

The Tulare Lake Basin Water Storage District has performed a useful function for the lake area and for the entire South Fork of King's River from its organization. It has furnished a common meeting place in which local differences could be resolved and a united front presented for its area. It has not constructed internal works or operated the division of water which reached the sump. Its results, in my opinion, have well justified its organization and the costs for its operation.

THE KINGS RIVER WATER CONSERVATION DISTRICT

In 1923 the legislature passed the Water Conservation District Act which enabled a group of other forms of public agencies to join in the construction of common works of benefit to all of the included units. This act was designed to fit the conditions on Kings River where about twenty different canals systems were considering joining in storage at the Pine Flat site. The number of separate units involved made a stronger form of organization than a simple partnership desireable. Such storage could have been handled under the water storage district organized under the Water Storage District Act. However, in the water storage districts the costs are allocated to each individual land owner in accordance with the benefits secured from the district plan. On Kings River, the units desired to use their local units to distribute the costs to the individual land owners in accordance with the particular form of district act under which they were organized.

The Water Conservation District Act provides that all of the included units shall be organized public agencies. On Kings River nearly all of the units were California irrigation districts. However, the three south Kings canals (Peoples, Last Chance and Lemoore) were mutual water companies. It was proposed that irrigation districts should be organized to take over these mutual water companies.

The organization of a water conservation district is initiated by a petition signed by at least three of the units so included. The act creates a Board of three members to conduct the district pre-organization procedure. This board consisted of the State Engineer as chairman and the two executive directors provided for in the Water Storage District Act.

The Conservation District Act requires the election on an organization to carry in all of the units to be included. The allotment of the costs are made by the Board prior to the election on organization. This makes it essential that there be a definite plan on which dependable cost estimates have been made and that there is an enforceable agreement on the service each unit will receive.

A petition for the organization of the Kings River Water Conservation District was filed on June 12, 1924. On this same date, the State Irrigation Board met and organized. W.F. McClure as State Engineer was chairman and W.P. Boone of Fresno and D. Joseph Coyne of Los Angeles were the other two members. Mr. Boone was chairman of the Kings River Water Association and did not participate in the legal actions of the Board. As I was doing the engineering work for the State Engineer on this proposed project, I was appointed secretary of the board.

A hearing was held at Fresno on July 16, 1924 and the sufficiency of the petition was approved. The Kings River Water Association undertook the engineering studies required for the district plan. George L. Swendsen was the engineer and manager for the Fresno District, Harry Haehl represented the lower areas on the North side of Kings River and Max Enderlein the lower areas on the South side. Swendsen also represented the Alta and the Consolidated Districts. I represented the State Engineer and worked with these local engineers. I also handled the procedure matters as secretary of the board.

From July 16, 1924 to May 4, 1928, a total of eleven adjourned hearings were held. These generally were progress meetings. However, at the hearing on July 9, 1926, the proponents were advised that a permanent river schedule was a prerequisite to the organization of the district.

The river was then being operated under a schedule dividing the first two thousand second feet of river flow. A schedule covering the total diversions was required if the storable flow was to be defined. The Board also advised the proponents that it would be reluctant to hold further hearings unless progress on such a schedule could be shown.

Four further hearings were held. At the hearing on May 4, 1928, the Board closed its hearings and suspended its activities on the petition until the proponents were ready to proceed. I, as secretary and engineer, was instructed to assemble the records and file them in the State Engineer's office. This was done.

This was the last hearing held on this district. By the time the proponents were ready to proceed, they had decided not to use the Conservation District Act for their project. The project as proposed in the 1920's has not been carried out as a Water Conservation District Act under the 1923 Act. Pine Flat was later constructed under the 1944 authorization as a flood control project.

I prepared a report entitled "History of Kings River Water Conservation District from Presentation of Organization Petition on June 1924 to May 1928". This report is No. 4 in Item 47 in my bibliographical file. In October, 1924, I had prepared a short report on the "Status of Water Rights on Kings River", which covered the schedule and progress on a more inclusive schedule. This report is No. 10 in Item 47.

Swendsen, Haehl and Enderlein made what became known as the Engineer s Report of May 1926. This report recommended a schedule for this river. The schedule adopted in 1927 by the main river and North Fork units was based on this report. The South Fork users did not accept their allotment under this schedule at that time and did not

become a party to the 1927 agreement.

The procedure under the proposed Kings River Water Conservation District was not productive of an organization or the construction of storage at Pine Flat. To this extent it failed to meet its objectives. This procedure was useful, however, in securing action on the Kings River Agreement of 1927 which defined the relative water rights of the parties to this agreement. By insisting that any storage at Pine Flat would have to be based on defined rights to the direct flow as a necessity for river operation, the Irrigation Board performed a useful service of sufficient value to the Kings River area to justify its proceedings.

The Water Conservation District Act of 1923 has not been used for any other projects. It is not probable that conditions on any other California streams will result in its use. The Irrigation Board named in the Act was carried for several years in the directory of the State Organizations. My name as secretary was included in this list. I used to receive occasional mail as secretary from those who saw this listing and thought the Board might represent a prospective customer for their products. This listing was eventually dropped.

The preceding discussion has been limited to the procedure in the 1920's relating the proposed Kings River Water Conservation District. I had done work previously on Kings River in 1912 in the preparation of the Central California portion of the investigations of the irrigation resources of the state and during World War I for the War Food Administration in getting the injunction against diversion by the Lakelands Canal removed. I also did work on Kings River concurrently with the conservation district procedure in the 1920's as a part of the preparation of Bulletin 11, "Ground Water

Resources of the Southern San Joaquin Valley". This is discussed separately later. My work on the organization of the Tulare Lake Basin Water Storage District has already been discussed.

After 1930, my work on Kings River was done as consulting engineer for the Tulare Lake Basin Water Storage District. This is described later.

THE HERMINGHAUS CASE 200 Calif. 81, 252 Pac. 607(1926), 275 U.S. 486(1927)

When storage for power purposes was planned on the upper San Joaquin River, the power companies made contracts with Miller and Lux permitting such storage to be operated under the terms of these contracts. The contracts included schedules under which the stored water was to be released as well as the conditions under which the reservoirs could be filled. This power development was made by different power companies and at different times. By the 1920's all of the power development on the San Joaquin River, except on the North Fork and at the Kerckhoff plant, the lowest plant on the San Joaquin River, had come into the ownership of the Southern California Edison Company. The power company had also made contracts with some of the other riparian land owners on the San Joaquin River above the mouth of the Merced River. These contracts were needed under the interpretation of the rights of riparian owners to receive the natural flow of the streams to which they were riparian.

The regulation of the stream flow for power use resulted in a net benefit to lower direct flow diversions. A larger part of the stream flow, as released after storage for power, occurred within the irrigation demand than the natural flow. While such power storage represented a net benefit over-all, the riparian owner could enjoin the storage if it resulted in a detriment to him. The riparian owner was not required to offset other benefits under the interpretation of riparian rights by the California court.

The Herminghaus Ranch contained about 18,000 acres. It was on the south side of the San Joaquin River a short distance above Fresno Slough. It was used for overflow pasturage. It had been rented by

Miller and Lux for $1 per acre per year. This represented a total net income after county taxes of about $12,000 per year. This represents a total value of $240,000 if capitalized at 5%.

Herminghaus had no diversion works on the San Joaquin River. Some overflow channels that received water at the higher routes of river flow transversed the Herminghaus land and discharged their surplus water into Fresno Slough or onto the lower San Joaquin river. This overflow had always occurred, as Lt. George H. Derby describes such southwesterly flowing channels in 1850. (Ex. Doc. 110 Sen. 32d Cong.)

To maintain the Herminghaus overflow, it was necessary to have the higher rates of stream flow continue to come down the river. The inlets of the overflow channels required various rates of flow in the river before flow would occur in the overflow channels. A river flow of 5000 senond feet was required to enable substantial overflow to occur.

The Edison Company had not made any contract permitting their power storage with the owners of the Herminghaus lands. The title to these lands had passed to the daughters of the original Herminghaus. One of these daughters was married to P.H. Bottoms who was the active spokesman for their interests.

The power company and Bottoms could not reach an agreement on a riparian contract and a suit to enjoin the power storage was filed on behalf of the Herminghaus owners. This suit was tried in the Fresno County court before Judge J.E. Woolley. Judge Woolley's lower court decision was dated in 1926. It upheld the riparian claims of Herminghaus to have the flow of the San Joaquin River reach their lands. This right was upheld regardless of the relative benefits that could be made

of the water by the riparian owner in comparison with the benefits to the upper appropriation.

While Judge Woolley's decision had support under his interpretation of the decisions of the California Supreme Court, the results were so extreme that it could not be allowed to stand without an appeal to the Supreme Court. Such an appeal was made by the Power Company.

This case involved such an extension of the rights of riparian owners that it attracted wide-spread attention. Following the decision in Lux v. Haggin in 1886 (69 Cal. 255) which recognized riparian rights in this state, the later court decisions had generally tended to espand the extent of riparian use that could be made under riparian rights, although there were a few cases that gave some hope that some measure of reasonableness would be required in the use by riparian owners. The lower court decision in the Herminghaus case, if upheld, would have eliminated paractically any standards of reasonableness in riparian use.

In the appeal of the Herminghaus case, a considerable number of other parties filed briefs as amici curiae. This is where I became involved in the case as I represented the state engineer, Mr. McClure, in the discussions of the issues involved. My part was the supplying of factual material relating to the effect this decision would have on the beneficial use of water on non-riparian lands.

The appeal of the Herminghaus case was first argued before the California Supreme Court on Jan. 15, 1926 and re-argued on July 29, 1926. It was decided by the Court on Dec. 24, 1926. The decision was written by Judge Richards. Petitions were filed for rehearing which were denied and this decision became final in the state court. The

original decision of the Supreme Court was signed by the required four judges. Judge Shenk dissented. The decision denying the petition for rehearing was by a decision of 4 to 3 of the seven judged.

Following the final decision in the California Supreme Court, the Edison Company filed a petition for a hearing before the U.S. Supreme Court. This was granted and an argument was held October 6, 1927. The arguments by Edward F. Treadwell for the Power Company were heard in the morning. The arguments by the attorneys for Herminghaus were to have been heard in the afternoon. On the opening of the afternoon session, Herminghaus was advised by the court that they would not need to present their arguments as the court had already decided against the Power Company.

The account of this argument in the Fresno Bee of October 7, 1927 includes the following:

"Edward F. Treadwell opened the argument for the company but encountered a constant flow of questions from members of the court, who expressed doubt whether questions were presented which the court had the right to review.

"He consumed all the time allotted his side for argument trying to establish that federal questions were presented which brought the case within the jurisdiction of the court.

"At the conclusion of his argument the court took recess for luncheon, and upon returning, notified riparian owners along the river, who had won in the state's court, that it would not be necessary for their counsel to reply, indicating that it had concluded no federal question was presented upon which it should pass and that the case must be dismissed for want of jurisdiction."

There were two main issues involving public interest in the

Herminghaus case. There were first the standard of reasonableness, if any, applicable to use of water on riparian land, in contracts between riparian owners and appropriators, and second, the extent to which storage for future use was within the riparian right.

On the first issue there was wide-spread support for some restriction on riparian rights based on more than merely "The pleasure of its prospect". Only some of the more favorably located riparian owners sought such an unlimited standard of use for riparian lands. If this had been the only general issue involved, support for the Power Company in its appeal of the Herminghaus case would have been widespread and emphatic.

In an effort to find a basis on which its storage could be judged on some degree of beneficial use in its contest with the lower riparian owner, the Edison Company attempted to claim it was also a riparian user. It based this claim on the actual ownership of a small area in its reservoir and its position as a licensee of the major owner, the United States. Not only did the Power Company need to prove that it was operating as a riparian right on riparian lands, but it also had to prove that its use came within recognized uses which riparian owners were entitled to make.

Generation of power from the direct stream flow was early recognized as within the riparian rights. Exercise of such a right by the early grist mills operated by water power was a usual practice. The mill pond storage used by such plants was also recognized as within the riparian right. Such ponds would be filled during the night to provide a larger power flow on the following day. This type of forebay storage has only a small capacity and the time of storage is short.

The Edison Company sought to secure court approval of the expansion of the previously recognized forebay type of storage to their large capacity reservoirs based on seasonal or future use. The large reservoirs involved in this case materially modified the seasonal flow of the river and had little relationship to the previously recognized forebay storage.

Based on the parties to the Herminghaus case alone the public interest would not have suffered if the position of the Power Company on future storage had been upheld. However, such a decision in this case would have become a precedent on other streams where its effect would have resulted in major losses.

While the riparian owners had the right to prevent appropriative upstream diversions which would reduce the flow at their land, this right could be lost by failure to assert it and adverse use by the appropriator under conditions which would establish a prescriptive right. The major part of the irrigation diversions were made by canals diverting to non-riparian lands with their points of diversion above the main areas of riparian land. Many of these diversions had become prescriptive against the lower riparian owners. They would not be prescriptive, however, against upstream riparian rights and their priorities would not be effective aginst upstream use if such use was based on riparian rights.

For these reasons, if the Power Company had been able to establish its storage for future use as a riparian right, they could have operated it without regard to the appropriative downstream rights. To prevent such results the irrigation interests participated in the appeal of the Herminghaus case in opposition to the Power Company in its position on storage for future use as a part of its claimed

riparian rights.

This position on the part of the irrigation interests was taken only after extended discussion among the irrigation interests. Former Supreme Court Justice Warren Olney, Jr. presented the arguments for the power companies. By this time the other power companies were supporting the Edison Company in its position. The Irrigation District Association, through its committee of attorneys, spoke for the irrigation interests. Former Senator Harris of Fresno was the attorney for the Kings River Water Association and was a major participant. A.E. Chandler was attorney for the Corcoran I.D., which had a high schedule right on Kings River and could be materially affected by any upstream riparian storage.

When the Power Company position had first been presented, I was working for the State Engineer on matters on both the Kings and San Joaquin Rivers. Its effect could be foreseen on these streams. I prepared a report for the State Engineer, dated October 1, 1925, entitled "Effect Which Would Result From the Establishment of the Right to Store as part of the Rights of Riparian Owners on the Feasibility of Proposed Irrigation Projects on San Joaquin and Kings Rivers". This 70 page report is no.1 in Item 40 of my bibliographical file. In it I discussed both the principles involved and the effect of their adoption on the appropriative rights on those two streams. This report was made available to the Kings River Water Association and the attorneys committee for the I.D.A.

Having made this report and taken a position in opposition to that of the power companies, I participated in the meetings of these two groups in the defense of its conclusions. I was a non-lawyer arguing against a group of attorneys. Chandler was effective in

arguing against the legal right of a riparian owner to store for future use and I provided the physical effects of such a right. Olney had nearly succeeded in getting Harris to file a brief supporting the power company position when a general meeting of the attorneys committee of the I.D.A. was held in San Francisco on October 12, 1925. Much of the time at this meeting was spent opposing my conclusions on the effect such a right would have. On this factual side I had an advantage over Judge Olney as a result of my familiarity with the runoff of the streams involved.

After an extended discussion, the attorneys of the I.D.A. voted to oppose the extension of riparian rights to storage for future use. A subcommittee was appointed to prepare a brief for submission to the State Supreme Court for the I.D.A.

Spencer Burroughs was then the attorney for the State Water Commission and had sat in on these meetings. He had supported my position. It was thought that a brief by the State would be helpful in opposition to a riparian right to future storage and Burroughs was asked to draft such a brief for submission to Attorney General Webb for his submission to the court. Burroughs agreed to do this.

When the meeting adjourned, Burroughs asked me to prepare a draft of such a brief emphasizing the policy side of the effect of a right of a riparian owner to store for future use. I agreed to prepare such a draft. I did this and Burroughs accepted it and submitted it to General Webb as I had prepared it. General Webb read it and asked me over to discuss it with him. I went and he told me he had expected to have to rewrite my draft but that when he read it he could not find any place where anything needed to be changed.

General Webb submitted the brief and argued in its support at

the hearing. The power company attorneys attempted to argue against some of the points raised in the brief. On Jan. 4, 1926, I prepared a discussion of the points raised by the opponents for General Webb. This is No. 3 of Item 40 in my bibliographical file.

The brief for the state had to be submitted by the Attorney General as the legal representative of the state. Not being admitted to the bar, my name could not be used as its author. This was fully understood and expected by me. I was glad to be of whatever assistance I could without regard to authorship credit.

In later meetings where the Herminghaus case was discussed, General Webb was very generous in his acknowledgment of my assistance in preparing the brief. It was a pleasure for me to have had this opportunity to work with him on this case.

The I.D.A. brief was submitted by their legal committee. Like usual similar committee efforts, it was mainly the work of one author. In this case this was A.E. Chandler. It was a solid brief analysing the cases on which the claim for a riparian right to store for future use was based and showing them to be of minor forebay type rather than for future use.

In its decision in the Herminghaus case, the Supreme Court upheld the lower court decision. It denied the right of a riparian owner to store for future use but granted rights to the power company for storage in the forebays of its several plants. The portions of the lower court decision relating to the right of a riparian owner to use water without any restrictions of reasonableness as against an appropriator was upheld.

The power companies did not accept the decision (relating to storage for future using being outside of the riparian rights) in the

Herminghaus case as being final. The same position was argued in later cases. This portion of the Herminghaus case was reaffirmed in Senaca Consolidated Gold Mines Co. v. Great Western Power Co., 209 Calif. 208 (1930). It was made more explicit in Colorado Power Co. v. Pacific Gas and Electric Co. 218 Calif. 559 (1933). Such storage for future use can now be accepted as being outside of the right of riparian owners in California.

The portions of the Herminghaus decision upholding the right of a riparian owner to have the full flow of a stream continue in order that he might receive the benefit of the overflow of a small part of the total flow without requiring constructed diversion works, and the broad statement regarding the riparian owner not being limited by any rules of reasonableness in contests with an appropriator were so extreme that there was extensive public alarm regarding the ability to make a reasonable use of the water of the state required for its development without having to pay excessive tribute to unreasonable riparian owners. Much effort was expended in legislative hearings and other meetings in seeking a remedy for this situation.

The testimony in the Herminghaus case was to the effect that a flow of 5000 second feet in the San Joaquin River was needed to result in flow in the Herminghaus sloughs and the flooding of their lands which the same extent of irrigation could be secured by a controlled diversion of 150 second feet.

In the Herminghaus decision, the court had stated that the riparian right, as they had recognized it in California, could only be changed under an exercise of the police power of the state, if this should be found to be required for the general welfare of the state. This expression was used as the basis for a constitutional amendment

restricting all uses of water to reasonable and beneficial purposes. After much discussion over its detail wording, what has become known as the Constitutional Amendment of 1928 was drafted, passed by the legislature and adopted by the voters at the election of November 6, 1928.

One of the amusing aftermaths of the successful accomplishment of the 1928 amendment was the surprisingly large number of persons who claimed to be its author. I was active enough in those proceedings to know what was going on and to put in my two-bits worth on the wording to be used. In this I was only one of many. Actually the 1928 amendment was the composite result of all of these efforts and no one individual can claim its authorship. Its benefits were large enough to include credit for all who participated. I also took a minor part in the election on its adoption.

The first case to reach the State Supreme Court in which the interpretation of the 1928 amendment was at issue was Gin Chow v. Santa Barbara, 217 Calif. 673. I had been a factual expert witness in this case but had no part in its legal arguments. This was a good case in which to test the applications of the amendment and it was supported by the Supreme Court. The Gin Chow decision was amplified and made more definite on additional items in Peabody v. Vallejo, 2 Calif. (2d) 351. I had no part in this latter case. The 1928 Constitutional Amendment has also been recognized by the U.S. Supreme Court. (United States v. Gerlach Live Stock Co., 339 U.S. 725 (1950).

Item 40 in my bibliographical file includes a draft of the state's brief in the State Supreme Court, comments on the arguments raised against this brief and comments on the decision as well as my report on the effects that could result if a decision that a riparian owner

could store for future use. Those have been discussed in the preceding parts of this account. In addition I have included in Item 40, copies of some of the correspondence relating to the state's brief and other matters relating to the case.

An interesting aftermath of the Herminghaus case was the litigation over the legal fees of the attorneys for Herminghaus. These attorneys were John W. Preston, who later was a justice on the California Supreme Court and James F. Peck, a veteran of many suits against Miller and Lux. Peck had been attorney for the Stevinson lands near the mouth of the Merced River.

Preston and Peck had the Herminghaus case on a contingency fee basis. While the suit was brought to secure an injunction against the operation of the parts of the Edison Co. projects for which public use had not intervened, it was recognized that its purpose was to secure compensation to Herminghaus for the alleged damages to his riparian rights.

After the decision by Judge Wooley in the lower court, an injunction had been granted against the operation of the newer Edison Company works and the case was under appeal. The Edison Co. made a financial settlement with Herminghaus under which the injunction would be waived for one year during the appeal. The reported price was $160,000 for this waiver. As this payment had been secured as a result of the decision, Preston and Peck received their contingency percentage of its amount. The next year a similar agreement was made at a reported price of $100,000 and the attorneys received their percentage of this payment.

When the Supreme Court upheld Judge Wooley's decision and injunc-

tion, the Edison Company negotiated a purchase of the Herminghaus lands at a reported cost of $50 per acre for 17,000 acres, making a total price of $850,000. This, at that time, was a liberal price for this grade of land having an annual net lease earning of $12,000 per year. This price represented relief from the injunction rather than the value of the land acquired.

The purchase of these lands was the result of the decision but was not a requirement of the decree. It was necessary on the part of the Edison Company in order to secure usefulness from their expenditure in the enjoined works.

The Herminghaus heirs did not pay their attorneys their contingency fee on this $850,000 purchase price, contending it was a separate transaction from the case. In 1928 Preston and Peck brought suit for $259,000 as their fee on the purchase of $873,200. This represented a 33 1/3 % contingency basis.

This suit was tried and Preston and Peck won and collected their fee. They had not tried this case themselves. Theodore M. Stuart had represented them in this trial.

In 1932 Stuart brought suit against Preston and Peck for $54,400 attorneys fees for the trial of the case in which Preston and Peck were awarded a $273,234.50 judgment against the Herminghaus heirs. This is a 18.5% fee.

Clippings relating to these suits are included in Item 40 of my bibliographical file. I do not have a record of the outcome of Stuart's suit, but it is my recollection that he won.

All that would be needed to make this method of collecting legal fees become a real comic opera performance would have been for Stuart to have used another attorney to try his case with this attorney suing

for his fees and so on indefinitely.

The Herminghaus case was renumerative to those who brought it to trial. Looking back, the public benefits exceed those costs. This case resulted in the 1928 constitutional amendment under which riparian rights were placed under reasonable control so that they could no longer extract tribute from other developments in excess of their reasonable damages.

The opposition to riparian rights on the part of the public as shown in the Herminghaus case, was not based on opposition to reasonable use by riparian owners. The irrigation of riparian lands under their riparian rights represents an equal public benefit to the irrigation of an equal area of similar lands under appropriation rights. The opposition to riparian rights was based on the ability of riparian lands to block other uses of water not reasonably needed by the riparian lands.

BULLETIN 11 - GROUND WATER RESOURCES OF THE SOUTHERN SAN JOAQUIN VALLEY

The legislature authorized investigations of the water resources of the state and preparation of a plan for their development in 1921. This work was undertaken by the state engineer. An organization was set up in his department, and the work was begun. Eventually these investigations resulted in what has become the Central Valley Project of the U.S. Bureau of Reclamation.

The public support for these investigations came largely from the areas in the southern San Joaquin Valley where the rapidly increasing use of ground water was resulting in the overdraft on the locally available supplies.

As previously discussed, I was in charge of investigations for the state engineer in Kern and Tulare Counties before those general studies were authorized. When the reports on these two counties provided quantitative results relating to the ground water overdraft, the state asked me to prepare a report on what was then known relating to the ground water resources of the whole southern San Joaquin Valley. I undertook this assignment. The result is Bulletin 11 of the Divisions of Engineering and Irrigation and of Water Rights, **"Ground water resources of the Southern San Joaquin Valley"**, 1927.

For the purposes of Bulletin 11, the southern San Joaquin Valley was defined as the area from the San Joaquin River south. I had covered the east side of this area in my previous work in Kern and Tulare Counties and on Kings River in the procedure of the Kings River Water Conservation District. For the east side of the valley, Bulletin 11 represents mainly bringing these results to the date of the report.

Bulletin 11 was prepared in 1925 and 1926. At that time information

on the ground water conditions on the west side was meager. Some development had been made in the Mendota area.

Bulletin 11 represents an inventory of what was then known regarding the ground water resources of the area covered. It should be judged on the basis of the time at which it was prepared. It served its purpose in the general investigations then being made by the state. Quantitative results were derived which indicated what could be expected to occur with increasing ground water draft dependent on the local supplies alone.

In 1925 quantitative studies of ground water supplies in California were relatively new. Conkling was working on his San Gabriel investigations. The U.S. Geological Survey's Ground Water Research was being expanded under Meinzer. The U.S.G.S. had had work underway for some years in the Santa Clara Valley, but the slowness with which their results had been made available resulted in the demands for local area studies being met by the state.

When local interest in its ground water supply was aroused by reports of ground water lowering about 1920, the first result had been to select observation wells so that the amount of change could be recorded. This had been done by Mr. Haehl in Kern County for the Kern County Land Company in 1919. It had also been done by some of the Kings River systems a year or two later. The state's investigations in Kern and Tulare counties followed the same practice.

While such well records were initiated as the natural first step in the ground water investigations not so much thought had been given at that time to the ways in which such records could be used in determining whether an overdraft existed, and if so, its amount. When I began the work for the state, I asked each agency collecting well

records what use they had made of the results and how they planned to use them in preparing an estimate of the amount of the overdraft. I found little attention had been given to this use of the results.

This is not a criticism of those collecting the records. It is a reflection of the youth of this branch of water supply engineering. When I began this work for the state, the state did not have a program relating to use of well records. Such well records have obvious usefulness in showing whether the ground water is going up or down and how much the changes were in vertical elevation. The translation of these results into the volumes of water represented by such fluctuations and the amounts of overdraft had to be worked out as we went along.

In studying the well records, I found that there were areas for which the surface water supply was being measured so that this supply could be compared with the resulting ground water fluctuation. As the water supply varied from year to year, the annual ground water fluctuation could be compared with the water supply. Trials of this procedure indicated reasonably consistent results and it was used in Bulletin 11.

It was recognized that a given water supply for an area only half irrigated would produce different ground water fluctuations than if the entire area was served. The water supply was expressed in terms of the acre feet per acre for the area it served. This could then be plotted against the mean change in the ground water elevation for the period covered by the water supply.

Some well readings were made on a monthly basis but many wells were measured only in the Spring and in the Fall. It was found that the Fall records gave more consistent results. The year ending after the close of the irrigation draft came before the season of the re-

charge from the winter water supply. It also included the period of use of the runoff of the preceding season. The best results were received where the available records included years in which the ground water both rose and fell. In 1924 the runoff was very deficient and the water supply in nearly all areas lowered naturally. The year 1922 had a better water supply and many areas showed a ground water rise.

When the annual rise or fall of the ground water was plotted against the supply received in acre feet per acre irrigated, the points for each year usually fell near enough along a straight line so that a trend line could be drawn. Where such a line crossed the point of zero ground water fluctuation indicated the amount of water supply required to maintain the ground water. This also represented the consumptive use of the crops grown in the area. The slope of the trend line indicated the specific yield of the ground water volume drained or filled.

As an illustration if the trend line crossed the zero of the ground water fluctuation at a supply of 2 acre feet per acre, such a supply would be required to maintain the ground water. In a year in which the supply exceeded 2 acre-feet per acre, the ground water would be expected to rise and conversely in a year having a smaller supply it would be expected to lower.

If the trend line indicated that in such an area in a year when the supply was only 1 acre foot per acre, the ground water would lower 6 feet, the indicated specific yeild of the area drained would be 16 2/3 per cent.

This method is sound where the total water supply is known. For the areas used, the surface supply reaching the area was measured.

The ground and ground water slopes were relatively small and the rate of movement appeared to be slow. Areas of overdraft did not appear to be materially aided by inflow from higher areas induced by the ground water lowering. On the Kaweah Delta lowering in the outer portion prior to 1925 had occurred without drawing out the higher portions. This method of analysis would be most effective in areas where the ground water inflow and outflow were relatively small or where they were nearly equal in amount.

This method would also be effective only in areas where the ground water reflects the use on its overlying area. Areas pumping from beneath confining strata fed from a distant source would not respond to surface use on the area. The method works best on open delta formations where the ground water reflects the surface use directly and quickly. Areas having ground water at a relatively shallow depth are best suited to this method.

The years used should have about the same extent of irrigation. It is not essential that all of the area is irrigated. If an area has a consumptive use of 2 acre feet per acre and only one-half of the area is irrigated, in a year in which the supply is only 1.5 acre feet per acre the ground water will lower by an amount required to supply the remaining 0.5 acre feet per acre from the entire area. This lowering would be only one-half the amount of ground water lowering that would be required for the same rate of surface supply if all of the land was irrigated. The extent of the area irrigated with a given supply expressed in terms of acre feet per acre will change the slope of the trend line but will not affect the point of its intersection with the line of zero ground water fluctuation.

The years which were used in the preparation of Bulletin

11 were those in which the ground water was relatively shallow in the method of estimating the water supply required to maintain the ground water elevation. There were areas having a surface water supply so that material ground water lowering had not occurred. The percolation losses resulting from irrigation reached the ground water directly and quickly and was reflected in the ground water elevation within the annual time periods used.

In an area where the ground water inflow from higher areas might be limited to its natural supply and where draft on its lower side might have resulted in ground water lowering, increased ground water slope and outflow, the method used would not take into account such outflow. Indications that this condition existed was found in only one area. The lands under the Calloway and Beardsley canals north of Kern River received a variable water supply in the years used in Bulletin 11. The ground water draft in the Shafter Wasco area was steepening the outflow slope. Some ground water outflow to the Shafter Wasco area might be taking place under the then conditions.

For the conditions at the time Bulletin 11 was prepared, it was found that the indicated consumptive use was about 1 2/3 acre feet per acre for areas mainly in trees and vines and 2 to 2 1/4 acre feet per acre for forage crops. Similar values were used in the early state reports on the Central Valley Project.

At present larger values are in use in this area for the amount of consumptive use. The actual amounts being used are shown in the various state and U.S.B.R. reports on the proposed units of their projects. This does not mean that either the Bulletin 11 or the present results are in error. The difference, in my opinion, is in the difference between the 1925 and the present conditions.

In 1925 an average alfalfa yield of 3 1/2 to 4 tons per acre was as large as could be counted on. In recent years the Agricultural Commission of Kern County reports an average county-wide yield of 7 tons. This increased yield is the result of additional fertilization and other improved practices. It requires increased use of water to provide the increase in yield. Similar factors enter for some other crops such as the increase in present cotton yields.

Another factor affecting the Upper Kings River areas is the general change in their ground water conditions. In 1925 much of this area needed drainage. The lands under the older Kings River rights received enough water to maintain this condition. In the last 30 years the increased pumping west of Fresno Slough has lowered the deeper ground water pressure sufficiently to increase the ground water gradient from its recharge area on the upper Kings River delta. This increase in grade has resulted in ground water movement from the recharge area which did not occur in 1925. The U.S.G.S. in W.S.P.'s 1360G "Ground Water Conditions in the Mendota-Huron Area, Fresno and Kings Counties, California", discusses these conditions.

In W.S.P. 1360G it is estimated that this induced ground water inflow to the Mendota-Huron area in 1951 was of the order of 200,000 acre-feet per year. This represents an increased demand on the ground water in the east side areas of recharge and an increase in the supply now available in the west side area. The water supply of the Fresno I.D. which was generally equal to its 1925 demand is now, under these induced conditions, inadequate to meet both the requirements of the District area and this recently created ground water outflow. In recent years the ground water in the Fresno I.D. has lowered generally from a depth of about five feet in 1925 to about 50 feet at present.

Bulletin 11, at the time it was prepared, represented what was then known relating to the ground water conditions in the area covered. As such a summary it served a useful purpose in the planning of projects to relieve the water shortage on the east side of the valley.

Now, forty years later, Bulletin 11 has remaining usefulness mainly as an inventory of 1925 conditions from which the changes that have occurred since 1925 can be determined. It also is useful in indicating the extent to which the technology of ground water investigations has advanced since 1925.

In addition to the continued observation of ground water elevations on a generally expanded scale since 1925, there have been major advances in the knowledge of the underground formations and the conditions under which ground water is confined and moves within the area. In 1925 the available well logs were usually in general terms as the well driller had noted changes during the drilling of the well. The Corcoran clay, or the diatomaceous clay as it is called in W.S.P. 1469, had not been identified in 1925, although it was recognized that some confining material was required to create the artesian conditions in the valley trough.

In 1925 there was much concern regarding the length of time overdrafts could continue without depletion of the ground water supply. This concern was both physical and economic. It was physical in that pumping equipment available made lifts of 300 feet about the limit that would be considered mechanically feasible. It was economic in that costs of pumping made such lifts unprofitable for general crops. There was recognition that the ground water supplies usually extended to greater depths than it would be feasible to pump them and physical exhaustion of the supply was not expected to occur.

Another matter of concern in 1925 was the changes that might occur in the quality of the ground water as overdraft continued. The experience in the Lindsay-Strathmore I.D. had shown one area in which deterioration in the quality of the local ground water had occurred.

Looking back now forty years later we can review the extent to which anticipations have been realized.

The improvement in the mechanical equipment used in ground water pumping, both in dependability and in economy together with increased yields and crop prices, have enabled ground water pumping to be continued to depths that would not have been attempted in 1925. Some abandonment of crop production resulting from increased costs has occurred on lower yielding soils or for crops of lower return. Overall the present extent of pumping under conditions of high lift is much greater than was anticipated in 1925.

Problems relating to the quality of the water pumped as the ground water has lowered have not been as severe as it was thought might occur. Such deterioration in quality is an ever present threat, however, where strata of good quality may become exhausted and the draft has to come from the poorer remaining strata.

Although imported water was not received through the Friant Kern Canal for about 25 years after 1925, no efforts were made to restrict new irrigation using the ground waters of the areas of overdraft. The rate of ground water lowering could have been reduced if the draft had been limited to supplying the area irrigated in 1925. The results that could be served by restricting the area irrigated were known and the desirability of such restriction as a means of maintaining this draft until imported water could be secured was recognized. The

failure to attempt such restrictions was the result of the system of title to the use of percolating ground water which had become established in California. The correlative rights of overlying oweners gave each such owner a right to use his share of the available ground water supply. The complications of attempting to enforce legal restrictions on owner use and the uncertainties of securing legal restrictions on use prevented any attempt to adjudicate the ground water use between individual users. The Raymond Basin decision came after Friant Kern canal water was being delivered into this area.

Attempts by the state to secure control over the ground waters in this area have not, as yet, been successful. Investigations have shown the large volume of ground water that is stored underground. This volume is several times the surface storage capacity it is feasible to construct on the tributary streams. The coordinated use of the surface and underground storage could enable larger deliveries to be made during periods of deficient stream flow. These overall physical advantages of coordinated operation are recognized. The economic advantages have not been fully investigated but to some extent there may be economy in coordinated use.

Plans to coordinate the use of surface and ground water supplies have made only limited progress to date. This has been the result of the natural desire of each area to retain control of its own use of water. The U.S.B.R. sells its C.V.P. water to local units without trying to control its use within the unit except that the amount sold is based on the needs of the unit for the supplemental water and includes consideration of the units' existing supplies. The state's activities in investigating the extent of ground water storage and its coordinated use have resulted in a feeling in some areas that the

state was seeking to secure control of its use for coordination with its overall state plan. This feeling, to date, has prevented progress in this matter.

When the demands for water in the state approach its available supply there will be an increased demand for the full use of all parts of the supply. Areas having available ground water storage can draw on this source in periods of deficiency in surface sources and release some of their surface supplies for other use. Physically such coordination can be beneficial.

The problems in this field, to date, have been largely related to the control of the operation of such coordination. The local areas naturally want to retain control of their own use of water. They do not consider that they should be required to incur added costs for pumping and to furnish ground water storage capacity without compensation. The present Director of Water Resources has not lessened the concern of the local areas in his statement that eventually water rights will be rights to a given quantity of water regardless of its source.

At present there is not sufficient need for the coordinated use of the ground storage of the southern San Joaquin Valley to supply the incentive needed to overcome the problems that are involved. If the advantages of such coordination become sufficiently great to provide such an incentive, some practical working basis for its accomplishment may be found. The chances for finding such a basis will, in my opinion, be improved if the right and desirability of leaving a maximum of local control are recognized.

IRRIGATION IN SIERRA FOOTHILL AREAS

There were two precedures relating to irrigation in the Sierra foothills in which I was involved in the 1920's. The principal point at issue in both of these cases was the extent to which such foothill lands were irrigable. The earlier case involved the Nevada Irrigation District. The second case related to the Utica Mining Company, which served lands around Angels Camp. In both of these areas former mining ditches had served some irrigation uses. When mining declined the irrigation demand was insufficient to provide revenue with which to maintain the canal systems. The Nevada District sought to provide increased irrigation. The Utica Mining Company, a public utility, sought to abandon its irrigation services. Both cases involved the practicability of serving foothill areas where the percentage of land that was feasibly irrigable was small and the cost of distribution was relatively large.

Both of these matters have now been determined and the issues involved are no longer pending. The results relating to the general question of the feasibility of irrigation in this type of land are pertinent to the general issues now active relative to the water requirements of the areas of origin and the preferences in serving a water supply which such areas may claim. The physical conditions have not changed during the last 40 years materially. There have been material changes, however, in the political and economic conditions.

NEVADA IRRIGATION DISTRICT

In 1922 the recently organized Nevada Irrigation District had an application pending for a license to develop power. The Federal Power Commission held hearings on the application which was contested

by other claimants to the water the Nevada Irrigation District proposed to use.

The Empire Mine was located within the Nevada I.D. It sought to have its lands excluded from the District on the grounds that if default should occur on the District lands, their mineral rights would require them to meet the District's default as a tax sale would include both surface and subsurface title.

This issue was eventually settled by the exclusion of the lands of the Empire mine from the Nevada I.D. before the District bonds were voted. I prepared some material for use by the Empire Mining Company in support of their petition for exclusion.

The owners of the Empire Mining Company also owned lands on San Juan Ridge including the Malikoff area which had been heavily hydrauliked prior to the injunction against such mining. There were extensive gold bearing gravels remaining which could be mined if a water supply remained available for such use and a means of storing the debris could be found. The proposed plans of the Nevada I.D. would divert to the District water from the sources formerly used on San Juan Ridge. I prepared a report on those water supplies and on the Nevada I.D. for the owners of San Juan Ridge. I testified in the Federal Power Commission hearing on February 1922. The Excelsior Water and Power Company was also a protestant against the Nevada I.D. applicant.

The Federal Power Act requires that in contests for licenses the Commission shall give preference to the applicant who proposes to make the most complete use of the resources involved. It is also required to give preference to public forms of organization. The Nevada I.D. qualified as a public agency; the other contestants did

not. The contestants, however, claimed that they would make a more complete use of the resources, power and water, than the Nevada I.D.

In this contest I was asked to report on the extent of the land in the Nevada I.D. which it was feasible to irrigate. This required a classification of the District of about 200,000 acres. Similar classifications were made by the District and other contestants. The District's results gave a higher irrigable area than the others. My results were among the lower ones.

The Power Commission decided in favor of the Nevada I.D. It sold bonds and built its upper power system including Bowman Lake storage. It conveyed its upper water to the power plants of P.G.&E. The P.G.&E. paid the District for the use of this water based on the power it could generate from it on its way to the District. These payments were expected to meet the bond payment charges as it was realized the extent and character of the irrigated lands could not meet more than their own internal irrigation costs. The history of the Nevada Irrigation District to 1928 is in Bulletin 21, "Irrigation Districts in California."

The Nevada I.D. became in default on its bonds in the depression of the 1930's. Adjustments were made with its bond holders reducing the interest rate on the bonds. At present the District is constructing additional water supply and power facilities under a new bond issue and contract with the P.G.&E. During the depression I purchased 3 bonds of the Nevada I.D. at a price of about $40. The reduction of the interest rate to 3% on the face value leaves a favorable rate on the price at which I purchased these bonds. Under the readjustment now scheduled to be made, on the completion of the present program, I will receive face value for these bonds when they are called or

exchanged for new bonds. Like other properties such as lands, etc. there were good opportunities for purchases at depression prices by those able to finance them.

The history of the Nevada I.D. to 1928 is well described in Bulletin 21. Two results justify comment in relation to the irrigability of this type of foothill lands. One of these is the slow rate at which the area actually irrigated has increased and the small percentage of the gross area of the original Nevada I.D. which is now irrigated after over 30 years of District operation. The second is the small costs for delivery of water to the district boundary to be met without assessments on the land. It was found that assessments on the land to meet costs for the improvement of the distribution system resulted in large delinquencies. This result occurred in an area where the cost of the original ditches had been met from their early use for mining. The prices paid by the District for these mining systems were relatively small.

The record of the Nevada I.D. since the 1920's has not been as favorable in regard to the increase in its irrigated area as the District anticipated in its earlier reports. In my opinion this record is characteristic of what can reasonably be expected in the development of this type of foothill land.

The preceding discussion relates to the area of the original Nevada I.D. In 1926 the original area of the District of about 200,000 acres was increased by the addition of nearly 70,000 acres in Placer County. This annexed area had been served by the P.G.&E. The Placer County area is also foothill land but it had a greater extent of actual irrigation than the original area of the Nevada I.D. This annexation occurred after the completion of the work I had done in this area, and I

did not have a part in it. In general the ridges in the Placer County area are more rounded and have lesser slopes than those in the original area of the Nevada I.D. They were more extensively developed at the time of their inclusion in the Nevada I.D.

The experience of the Nevada I.D. in its 40 years of activity illustrates the difficulties of developing irrigation in the foothill type of land. Much of the area is steep or has shallow soil over hardpan. The part of the cost of a distribution system extending over a whole area which the small part of the land which is actually irrigated can meet is limited. Even prior to the operation of the Nevada I.D. the areas irrigated under the old mining ditches were small and had not been increasing materially. The improvements in the distribution system made by the Nevada I.D. have not resulted in a rate of increase in the irrigated area large enough to meet distribution charges.

While the conditions in the original area of the Nevada I.D. are not as favorable generally as those in the Placer County lands which it included later, the original area is fully equal to similar foothill lands further north. The Placer County area includes the foothill deciduous fruit areas which produce the green fruits marketed in the summer season.

The overall interests of the state will not be harmed by the provision of a water supply for the foothill areas which can be practically and profitably irrigated. Unlimited reservations of water for such areas where the probabilities of such future use are remote and uncertain will prevent more economic uses of the reserved water, in the generation of power and in the irrigation of equally desirable crops in the lower main Central Valley floor or elsewhere.

IRRIGATION SERVICE OF UTICA MINING COMPANY

The Utica Mining Company (Hobart Estate, Owner) owned old company ditches in the vicinity of Angels Camp. Water was diverted from tributaries of the Stanislaus River and used for power, irrigation and domestic purposes in the 1920's. The power was sold for general use after the closing of its mine at Angels Camp.

This property had been built for mining purposes. Some irrigation use was supplied to lands adjacent to its main canals or on short branches. The extent of the irrigation use which the Company had been able to secure was insufficient to provide enough reserve to meet the operating costs. The Company operated as a public utility. The Company could see no prospect that its irrigation service could earn a return and brought proceedings before the Railroad Commission seeking permission to abandon the irrigation part of its operations. It did not seek to abandon its municipal service to Angels Camp or its power plants.

The land owners in the area of service opposed this application and contended that there was sufficient irrigable land under the ditches to make their service profitable if efforts to serve these lands were made by the Company.

I was employed by the Utica Mining Company in 1927 to investigate and classify the area of service and to report on the feasibility of expanding their irrigated area. In May 1927 I made a report on "Feasibility of Increasing the Area Irrigated by the Ditches of the Utica Mining Company". In June 1930 I made a report entitled, "Conditions in Other Foothill Irrigated Areas". Both of these reports are in Item 41 of my bibliographical file. I also testified in the hearings before the R.R.C. My work was mainly on the land classification. Mr. Harry

Haehl did the engineering relating to the valuation of the properties used in the irrigation service. Mr. James Ballard did the engineering work for the Utica Mining Company needed to provide both Mr. Haehl and myself with our basis data.

The areas available for irrigation in the service area of this utility were found to be scattered and limited in extent. Any rate for water which would provide a return for the company would be greater than the value of the service to these lands. The small scattered areas being served were not paying water charges which would meet the costs of their own service without any costs for the use of the main canals. On this basis it was my opinion that the company was entitled to abandon this part of their utility obligation.

To compare the conditions under the Utica Mining Company system with those in other foothill areas, I investigated the foothill area from Tuolumne County to the Brown's Valley I.D. The results are in my June 1930 report and do not need to be repeated here. I found generally that only limited increases in the areas being irrigated were being made in these foothill systems and that the returns from the service to the lands being served were not meeting the costs.

A similar report made today on these other systems would find only limited changes in the 1930 conditions except in a few cases where additional storage and distribution works have been materially subsidized. There have been some improvements in the systems having municipal demands.

The Utica system offered to give its irrigation canals to its users with water from the main canal to meet their irrigation use. These owners recognized that they could not maintain and operate this service at a reasonable cost and declined to accept the offer. The

R.R.C. did not approve the abandonment of the irrigation service of the Utica Mining Company in these proceedings.

Since these cases ended the situation has been worked out locally. The P.G.&E. has acquired the power plants and appurtenant canals. Irrigation has not increased materially in this area in the ensuing 30 years after the effort to abandon the utility obligation. Adjustmusts have been made with the land owners on some of the areas of service.

GENERAL COMMENTS ON FOOTHILL AREAS

Both the Nevada I.D. and the Utica Mining Company have worked out their local problems in the years since the work I did in these areas was completed. In neither area are the present problems relating to public policies affecting the areas of origin of particular difficulty. Each area has existing water supplies for its probable irrigation demand under water rights that have a sufficiently early priority to be established or under later dates which will probably not be subject to serious attack.

For these areas, the results that have been presented may have some historical interest. They do represent examples of the actual results of efforts to expand irrigation in the foothill area. This is useful in the general discussions of the ultimate water demands of these foothill areas of origin, and the reservations of water which should be made to meet such future needs.

The area of origin problem for the Sierra foothill areas includes both the legal or policy standards that should be used in reserving water for their future use and also its practical applications in terms of how much of the foothill areas will actually use water and what will be the extent of its water requirement. I have discussed

the legal and policy standards of the area of origin preferences in "Water in California" which I published in 1960. This discussion does not need to be repeated here. The comments made in this book are, in my opinion, still applicable.

Looking at the practical side it is my opinion that the extent of the future demand for water for irrigation in the Sierra foothills has been overestimated. This area has had extensive ditch systems built for mining widely distributed within the areas considered to be climatically adapted to orchard irrigation for some 100 years. In this time these areas have made only a limited use of such supplies for irrigation. Economic conditions may change but the physical handicaps of these areas will remain. It is not to be expected that extensive irrigation development will occur. The recent increases in water supply and canals for irrigation have been limited in extent and substantially subsidized in cost.

In so far as the area of origin reservation relates to the Sierra foothill areas, it is my opinion that quantitatively it has been over-emphasized. The sound and the fury of its discussion have exceeded its importance as a factor in the total use of the state's water supply. Further discussion of this subject is included later in my comments on Bulletin 58 "The Northeastern Counties Investigation".

The preceding comments relating to the area of origin reservation have been restricted to the Sierra Foothill areas where there have been opportunities during the last 100 years to develop irrigation from available systems constructed for mining. For the North Coastal Areas, where the area of origin preference is also an active issue, the physical and historical conditions differ and the results of an area of origin preference may be different.

THE MONTAGUE WATER CONSERVATION DISTRICT

The Montague Water Conservation District is located in the Shasta Valley adjacent to the town of Montague. It used the optional provision in the irrigation district act permitting it to call itself a water conservation district. This provision was placed in the law and was used by the Montague district in the hope that the name Conservation District would receive a more favorable reaction in the bond market than the term Irrigation District. There had been defaults in the bonds of some California irrigation districts. Otherwise the conservation district functions under the same statutes as the irrigation districts.

I participated in two procedures for the Montague W.C.D. The first related to a law suit seeking to secure additional water from Parks Creek mainly for storage in the district reservoir on Shasta River and the second was testimony for the District in opposition to the protests against the adjudication of the rights to the water of Shasta River made by the State Division of Water Rights. Both procedures may have some historical interest . The issues in both cases are now closed.

The sponsor of the Montague W.C.D. was Dr. Dwinell. Without his leadership and persistence the district would probably not have been organized and its works constructed. Dr. Dwinell was very highly regarded both locally and among others who knew him. He was a good friend of Mr. McClure and of people prominent in San Francisco's legal and financial activities. His standing enabled him to promote the district and finance its works. Dr. Dwinell was a man of high principles with a desire to help his community. While the project did not realize his hopes, in my opinion, this was the result of the physical condi-

tions rather than the fault of Dr. Dwinell.

The history of the Montague District to 1928 is described in Bulletin 21, Irrigation Districts in California, p. 56. I began work on the Parks Creek case in 1927 and testified during 1928. Further procedure resulted in additional work on this case in 1931. The contests on the adjudication by the state were heard in the superior court in November, 1928.

The stream flow of the Shasta River at the district reservoir site was insufficient for the district's needs. Parks Creek is adjacent to Shasta River near the reservoir. There was a ditch between the two streams through which water from Parks Creek could be diverted to the reservoir. Below this point of diversion, Parks Creek was used to irrigate the Duke Ranch. W.D. Duke raised bulls and pastured the lands he irrigated. Much of his land was riparian to Parks Creek and he based his claims on his riparian rights. On this basis, under prevailing decisions, Duke could claim title to all of the flow of Parks Creek which might be of any value to him. Duke was not, at that time, limited by any standard of reasonableness in contests with an appropriator. The 1928 constitutional amendment had not been passed when Duke filed his suit to enjoin the proposed diversion by the Montague W.C.D.

My part in this case for the Montague District was to prepare testimony on the reasonable needs of Duke's land which he could beneficially use. Any surplus flow of Parks Creek would be divertable by the district without any injury to Duke.

My work on this case was mainly directed to a determiniation of the reasonable requirements of the Duke lands from which the surplus could be defined. I went over the lands and prepared conclusions on on this issue. The results are contained in my report, "Water Requirements of Lands of W.D. Duke Supplied From Parks Creek." This report is

Item 42 in my bibliographical file. It is dated March 1928.

Duke was an interesting character. He claimed to have been Henry Miller's bodyguard for many years. Whatever his background may have been, it lost nothing in the telling. During the trial, the evenings were usually regaled with Duke's reminiscences.

In my testimony in 1928 I described the areas and conditions under each of Duke's diversions. For one area he had testified regarding irrigation. I had found the flume down and the irrigation abandoned. Duke was probably sincere in his testimony, but he did not spend much time on his land and was not as familiar with the actual conditions as I had become in my field work.

Duke resented my contradiction of his testimony. In 1931 in further procedure in this matter he refused to let me go on his land for additional field work. This is the only case in my experience where the attorney with whom I was working had to get a court order permitting me to examine lands at issue in litigation. Such refusal by a land owner will usually react against him if it is brought out in the trial. Duke raised bulls, and I did my field work on foot. My main problems were to get over the lands without argument with the bulls. The fields were large and the fences far apart. There was only one instance where I had to best a bull to the fence. The herd of bulls generally paid no attention to me unless there were cows in sight. This was another case of showing off before the women.

Duke secured an injunction in the 1928 case. In 1931 the district sued to condemn the right to divert the surplus flow of Parks Creek. I also testified in this case. It was this later case in which the attorney secured the court order permitting me to go on Duke's land.

The State Division of Water Rights completed its findings in the

adjudication of Shasta River in 1928. These were made available to the claimants and a period of time in which protests could be filed was allowed. A number of protests were filed, mainly to increase their own rights with some objections that the finding for others were too liberal in area or rate of use. These contests were heard by the superior court of the county. Some of the protests, if allowed, would have increased the diversions which were adverse to the Montague District. I was asked to prepare rebuttal testimony to those protests for the district and did so. In this I appeared as a witness for the district. Actually I was practically appearing as a supporting witness for the Division of Water Rights. The court upheld the findings of the Division.

The lands in the Montague W.C.D. consist largely of separated areas in which alluvial material has been deposited on the underlying lava. The canals which were excavated through this alluvial material were subject to leakage. Much work and cost were required to reduce these losses in the district's main canal.

The dam at its reservoir on Shasta River is a hydraulic fill. This is one of the last of this type and size built in California. D.C. Henny of Portland, Oregon was the consulting engineer and John Beemer was the resident engineer. The dam has fulfilled its purpose. However, when storage began and the water rose in the reservoir, leakage occurred through the lava rock abutments. After considerable grouting, much of this leakage was checked. I have not had contact with the district in recent years but in the earlier years of reservoir operation it was only partly filled in order to avoid excessive leakage.

The lava rock ridge between the reservoir and Duke's land on

Parks Creek was relatively narrow. When storage in this reservoir began leakage to Duke's land also occurred. Duke secured the return of some of the water which the District had condemned.

The runoff of Shasta River at the reservoir site is subject to wide variations in different years. The State Division of Water Rights was adjudicating the water rights on Shasta River when the District was being organized and developing its plan. The state made a report on the water supply it considered would be available to the district. As this report was more optimistic than that of the engineer of the District, F.H. Tibbetts, he used the state's estimate. When the District applied for certification of its bonds, it could show that its estimates of its water supply were those of the state. The District Securities Commission did not have much of a basis on which to question these results. This illustrates what may occur where the state is both engineer and judge of the feasibility of projects. A similar situation will now occur when the District Securities Commission passes on bond issues of irrigation districts which will purchase water from the state project under contracts which will have been made with the Director of the Department of Water Resources who is also a member of the Irrigation District Securities Commission.

The Montague W.C.D. has not occupied a major position in the development of the water resources of the state. It has had its own local problems. Their handling by this district can have usefulness in other projects having similar conditions. While my work for the District was a minor factor in its development, it had its interesting features which I enjoyed.

THE ASSOCIATION OF WESTERN STATE ENGINEERS.

This association was formed as the result of a meeting in Denver in 1927 which was attended by seven of the western state engineers. They recognized the common interests of their duties and the advantages which could result from cooperative actions. Such actions required meetings for discussions of the policies involved in order that agreements could be reached on the positions to be taken.

A second meeting was called in Salt Lake City on October 29-31, 1928. The seventeen western state engineers completed the organization and held their First Annual Meeting. A constitution was adopted and officers for the ensuing year elected. The proceedings of this first meeting were published by the Association. This organization has continued to date. Its annual proceedings represent a file of the subjects that were of active concern to the members, over the years since 1928.

The membership consists of the state official in charge of the water activities of the state. The titles of these officers vary in the different states, but in 1928 the more usual title was state engineer. At present the engineering work of the states is more generally divided between separate branches of engineering such as water and highways and the titles designate the duties of each agency.

While not covered in its constitution, it was agreed at the first meeting that the Association would avoid discussion and action on matters which were controversial between the states. This was pertinent in 1928 as Colorado River controversies, particularly between Arizona and California, at that time were pending. The general observance of this rule over the years has been a main factor in the

continued maintenance of this organization. There have been enough matters of common interest to justify the organization. The voting in the association is limited to the one member for each state. To enable each member to have others from his state available to assist him on matters which might arise, provision was made for two associate but non-voting members from each state. This is where I came into the picture as Hyatt appointed me as one of the two charter associate members from California. I continued as an associate member through the periods of tenure of Hyatt and Edmonston until 1955. I attended the first meeting and nearly all of the meetings while I was an associate member.

The charter members are listed in the Proceedings of the First Meeting. None now hold their positions. Of the 17 all but three are known (to me) to have died and my information on these three is not up to date. Of the associate members I remained a member longer than any of the other associates. I may now be the last surviving charter associate member.

Over the years the association of Western State Engineers has been affected by the changes that have taken place in water policies and activities. In 1928, federal activity was mainly limited to the Bureau of Reclamation and it was limited in its funds to certain receipts of the federal government from its land sales and oil leasing activities. The state engineers were mainly concerned with the procedural practices of their offices and the earlier meetings included discussions of such matters.

The members were cooperating with the U.S.G.S. on stream measurements and in the earlier years of the Association were concerned about the delays in the publication of the annual results. A considerable

part of one early meeting was devoted to putting N.C. Grover, then head of the Surface Water Branch of the U.S.G.S., on the grill over the delay. The annual water supply papers were then three or more years overdue. This discussion resulted in improvement in the time of publication.

Another question then active was the extent to which federal agencies should comply with state procedures in the acquisition of water rights for federal projects. The U.S.B.R. had its Sec. B. requirement. The federal government had used its control over rights-of-way over public lands to block some developments adverse to federal projects. I was asked to prepare a paper assembling instances when failure by the federal agencies to conform with state water rights law was claimed. I asked each state engineer to supply me with the record for his state. I compiled these results in a paper presented at the fourth meeting in Sacramento in 1931. It is in the proceedings of that meeting and was reprinted in 1957 in the "Conference on Legal Problems in Water Resources" sponsored by the University of California School of Law at Berkeley. This reprint was an appendix to a paper on the "Western Water Rights Settlement Bill of 1957" by Charles E. Corker. A copy of this report is No. 1 in Item 87 of my bibliographical file.

I presented a talk on the "Probabilities of the Drought Cycle" at the 1926 meeting of the association in Santa Fe. This is included in the Proceedings of the Ninth Meeting in that year. It is also No. 2 in Item 86 of my bibliographical file. The drought of the early 1930's had resulted in much interest in the probability of its recurrence and whether it could be predicted on some cyclic basis.

Beginning in 1937, the Association adopted a practice of having

each state present a ten minute talk on the current matters in the state. These were presented by the state engineer or some one representing him. In some years these talks were assigned a general topic to be emphasized, such as ground water. In 1948 I prepared and presented the statement for California at Flagstaff. This is in the Proceedings for this year. A copy is No. 4 in Item 87 of my bibliographical file.

During the 1940's when Strauss was Commissioner of Reclamation, the engineers in the Bureau of Reclamation had been down-graded in policy matters. The older engineers in the Bureau were being pushed aside. The politicians who had taken over did not dare to interfere with the design and construction of the project works as a failure of Bureau structures would have reacted against the whole organization.

This situation was particularly bad in California while Richard Boke was regional director here. I tried to help some of the former graduates of the Irrigation Department of the University who were working for the Bureau to hold their jobs and still retain their engineering integrity until changes in the Bureau might be secured.

I was going to the 20th Annual Meeting of the Association of Western State Engineers at Boise in September 1947. On the way to the meeting I tried to phrase a resolution which would call attention to this situation and not be so strong that the state engineers would be afraid to pass it. I worked up a draft and on arrival took it up with Hyatt. He agreed with the draft but did not offer much hope that it would pass. He offered to present it to the resolutions committee, however, and he did.

Alfred M. (Long Tom) Smith of Nevada was chairman of the resolution committee. My draft did not receive the approval of the resolu-

tions committee when first presented. Smith offered to report it without recommendation and let the Association as a whole vote on it. The chances did not look good but this was all I could expect to get from the resolutions committee.

The second night of the meeting, members of the House Committee on Public Lands were in Boise on their usual annual tour of federal projects. There was a joint dinner of the committee and the association. Congressman Miller of Nebraska, in his talk at the dinner, stressed the difficulty Congress was having getting reliable information from the present Bureau of Reclamation witnesses.

The next day the congressional committee went on a trip to see Anderson Dam. Some state engineers, including Hyatt, went along. Hyatt left me his proxy for the Association meeting when the resolutions were to be considered. This entitled me to speak in support of the resolution I had drafted.

The Bureau was represented by Asst. Com. Kenneth W. Markwell. Markwell had been an engineer in one of the depression agencies but was not a previous Bureau engineer. After the resolutions approved by the resolutions committee had been reported and passed, Smith reported my resolution without a committee recommendation. I used the comments of Congressman Miller to support my position. Markwell argued against me.

The state engineers were familiar with the situation in the Bureau and recognized the merits of the resolution. However, Bureau funds had become such a large factor in many of the western states that the engineers were afraid of the reactions through their governors if they took any critical action relating to the Bureau.

After the discussion of the resolution was ended a vote was taken.

It carried 10 to 6. Mark Kulp of Idaho was the president of the Association that year, as well as State Reclamation Engineer. As soon as the meeting was over, he gave the resolution to the A.P. who put it on the news wire. This blocked any "cold feet" reactions and the resolution stood.

Like most similar resolutions this one did not produce any world shaking results. It was a satisfying expression of the feeling, then wide-spread among the engineers, of their dislike for the political control of the Bureau. It was reprinted in the Western Construction News for October 1947.

The resolution is as follows. Anyone familiar with the situation in 1947 will recognize the balancing of commendation of the work of the Bureau and condemnation of those responsible for its loss of standing.

TWENTIETH ANNUAL CONVENTION, ASSOCIATION OF WESTERN ENGINEERS, RESOLUTION No. 8

WHEREAS, the Bureau of Reclamation has established an outstanding reputation as an efficient and economical Federal Agency, devoted to the development of the West; and,

WHEREAS, the welfare of the Western States requires that the agency representing the Federal government in its reclamation work be experienced in such work, and loyal to the purposes and policies on which the accomplishments and reputation of the Bureau of Reclamation have been established; and,

WHEREAS, changes during recent years in the personnel of the directing staff of the Bureau of Reclamation have resulted in replacements of experienced men and the introduction of debatable policies, based on questionable social theories; and,

WHEREAS, the loss of confidence by Congress in the present administration of the Bureau of Reclamation was apparent in recent Congressional hearings and action on appropriations for the Bureau:

NOW THEREFORE BE IT RESOLVED, by the Association of Western State Engineers at its twentieth annual meeting, in Boise, Idaho, on September 11, 1947, that the direction and control of the Bureau of Reclamation be returned to those experienced and qualified for such work, in order that the standing of this organization may not further deteriorate, to the great detriment of the Western States, which have such a vital interest in the work of the Bureau.

AND BE IT FURTHER RESOLVED, that the President of the United States be urged to restore the Bureau of Reclamation to the management and direction of those capable of maintaining the high standing of the Bureau and the confidence formerly held in it by Congress and the people of the Western States.

On October 21, 1947, Secretary of the Interior Krug wrote to Mark Kulp objecting to Resolution No. 8 as passed at the Boise meeting and asking Kulp to specify details regarding what the association meant in the several clauses of the resolution. On November 28, 1947, Kulp replied, sending copies of his answer to the members of the association. Kulp's answer is worth including here. It follows:

Boise, Idaho, November 28, 1947.

Hon. J.A. Krug
Secretary of the Interior
Washington, D. C.

Dear Mr. Krug:

I have your letter of October 21st, 1947, addressed to me as President of the Association of Western State Engineers, and requesting my advice and counsel as to your interpretation of the general references in Resolution No. 8 as passed by the Association in its 20th Annual Meeting in Boise, Idaho.

Resolution No. 8 must be considered as an expression of the composite reaction of a majority of the members of the Association to existing conditions. I have no information as to the individual reactions of the various members. Some may have been thinking in terms of personalities, some of particular incidents of policies, and others may have been influenced by successions or accumulations of unsatisfactory situations.

We must assume that your staff and subordinates are loyal to you and carry out your policies. Any policy that threatens the rights of the states to administer and control their water resources is unsatisfactory to the members of this Association, although the individual members of the Association may have divergent ideas as to the specific policies as they interpret them.

Very truly yours,

MARK R. KULP

President

I had another interesting time at the 1948 meeting of the association in Flagstaff, Arizona. Governor Warren had requested that neither Hyatt nor Zander attend for California. I was paying my own way and not subject to the Governor's approval of out of state travel. This was the year Warren was hopeful of presidential consideration.

Hyatt gave me his proxy for the Flagstaff meeting to help insure that there would be a quorum for any official actions. I arrived in Flagstaff for the meeting and found an urgent phone call

from Hyatt. The Governor did not want a California vote to be cast by anyone representing California on any controversial subject. What this meant was that no such vote should lose any votes for Warren in any of the other states. I agreed to refrain on any such issues.

The main controversial matters were those relating to the Colorado River. The association had avoided dividing its members on such matters. To try to avoid any controversy in the program I went to the Arizona members and proposed that we agree that neither Arizona nor California would make any reference to Colorado River matters during the meeting. They agreed. I then went to the other Californians at the meeting and told them of this agreement. Mike Dowd and Ray Matthews were there from the California Colorado River Board. They were itching for a fight but agreed that they would not start it. I think they hoped that Arizona would break the agreement. All went well until the breakfast on the final day when some Arizona publicity agent placed material at each place presenting Arizona's position. The responsible Arizona representatives hustled around and collected these before they caused trouble. I have always been grateful for the attitude and action of the Arizonans in this matter.

In 1950, there was great interest in national water policy. My part in the activities of the Engineers Joint Council is discussed elsewhere.

National water policy was a natural subject on which the association of Western State Engineers could speak with background and authority. By 1950, the amount of federal money being made available in the western states for water development had resulted in the desire to

continue to receive such funds outweighing the principles relating to the policies being used. The Association took no active part in this widespread discussion.

I was asked to discuss the activities of Engineers Joint Council relating to national water policy and the president's temporary water resources policy commission at the 23rd Meeting of the Association in Santa Fe in 1950. I did this, reviewing the development of the demand for definite and consistent policy standards for all of the federal agencies. My paper is published in the Proceedings for this year of the Association, pp. 55-61. A copy of my talk is No. 5 in Item 87 of my bibliographical file.

The Association at its 1950 meeting passed a resolution asking the President's Water Resources Policy Commission to give primary consideration to a uniform policy and procedure for all federal water development agencies. It did not specify any details of policy except general recognition of state laws, compact procedure and local management. This resolution was a "safe" one which would not get the Association into any controversial difficulties. Neither was it specific enough to be of much help to the President's Commission. In my opinion, the Association defaulted where it could have been positively helpful.

During the depression in the 1930's, the members had difficulty securing travel costs from their states to separate meetings of the Association of Western State Engineers. To keep the Association alive it was necessary to hold the annual meetings at the same place as the National Reclamation Association, usually on the day preceding the NRA meeting. As many members were on NRA committees these meetings were usually poorly attended and without much program. In these years

the interests of the western states were largely in securing federal funds and the NRA was more effective in this than the Association of Western State Engineers. Later the Association was able to go back to separate meetings with a better organized program.

The Association has been organized and operating long enough now to enable its accomplishments to be appraised. I have not attended any of the meetings since 1960, but have been in general touch with its later results.

In my opinion the most effective years of the Association were from its organization until the Depression restricted its activity. Its activities in those earlier years were directed to the specific duties of their offices such as water right procedure and their cooperative work with federal agencies such as the U.S.G.S. In the depression the emphasis politically in the western states was on securing increased emergency relief funds for irrigation projects. Efforts by the state engineers to secure better procedures in project investigations were not favorably received by the federal agencies. Usually the governors were not inclined to support any efforts to improve the project engineering if it involved any risk of reduced federal allotments. At present the individual state water engineers have had their influences reduced by the preponderance of federal projects. The western states, other than California, have not had the resources to make adequate investigations of their own water development.

The Association of Western State Engineers can perform useful functions if they can secure political support in their individual states so that they can speak with weight. To do this will require filling the positions of state engineer with individuals having the standing needed to secure such authority and influence. In the

eleven Colorado River and Pacific Coast states there is now increased activity in inventorying their own resources and needs. This should lead to increased stature for those in charge of such work.

I thoroughly enjoyed the over 25 years of my associate membership and activity in the Association of Western State Engineers. I found it an effective means of keeping in touch with legislation in the other states and their water right practices. This was directly useful in my teaching of Irrigation 101 and 106, the water rights and organization courses. The personal associations were also very pleasant as I had contacts with many of the members in my own practice in their states. The state engineers, particularly in the earlier years of the Association, were an interesting group. Those earlier members would be lost in this era of unlimited funds.

LAND CLASSIFICATION IN THE SAN JOAQUIN VALLEY, 1929-1931

The earlier investigations by the state, which led to the plan for the Central Valley Project, had not included a classification of the lands in the areas to be served. When the investigations of a state program were underway in the 1920's, Paul Bailey had an engineer traverse the valley east to west on the township lines and estimate the percentage of poor lands for which water would not be needed.

In 1929 the state had drawn a line around the upper edge of the valley land in the southern San Joaquin Valley and planimetered the gross area included. This area was being used as the basis for the estimated water requirements of this part of the Valley.

In my work for the state engineer in the 1920's, I had classified the lands in the proposed water storage districts and on Kings River. From these results it was apparent that there were sizeable areas which could not meet the cost of imported water due to the poor quality of their soils.

I called Hyatt's attention to this condition and recommended that the state's program should not attempt to serve such lands. This naturally led to a need for a definition of where such lands were and their extent. A classification of the valley lands was needed. This in turn led to the question of who should make the classification. The program of the state's investigations required that the results of such a classification should be available in early 1930.

There was no time for a detailed soil classification. Much of the area was already covered by U.S.D.A. Soil Surveys. What was needed was a reconaissance type of classification of irrigability. The main

factors which would eliminate land from a state project would be depth of soil, topography and alkali.

As I had raised this question and had already classified a substantial part of the Southern San Joaquin Valley, I was asked to make this classification. I agreed to do this and began work in June, 1929. The standards to be used were first adopted. I then started to cover the area from the San Joaquin River south, using the results of my former work and filling in the remainder.

As I was due to resume my teaching when the University opened in August, time was short. The greater need was for results on the lands on the east side in the valley trough. These were the lands then under consideration for service from the Central Valley Project. I covered these by the middle of August. This required my working long days, 7 days a week.

The classification was made by auto, driving all roads and other entries to the land. As the work was done in the summer, the growing crops furnished an index of the land quality particularly where alkali was involved. The report on this area was completed in September, 1929. A copy is Item 48 in my bibliographical file. The resulting map is also included in this item.

The September, 1929 report covers lands south of the San Joaquin River except for some west side lands which were covered during the 1929-30 Christmas recess. Harry Barnes made the classification of the lands which had been included in the proposed San Joaquin Water Storage District. I later covered the valley lands north of the Merced River. I also later covered the east side foothill lands north of the San Joaquin River. The later supplemental reports are in Item 49 of my bilbiographical file.

The several reports on the valley floor lands in the different parts of the San Joaquin River Basin were combined in Appendix A of Bulletin 29 of the State Division of Water Resources. A copy of Appendix A of Bulletin 29 is Item 48a in my bibliographical file. Bulletin 29 is item 62. The results were also included under Land Classification, p. 101 of Bulletin 29. Plate V is a map of the San Joaquin Valley showing the areas of each land class from one to five.

In this classification, five classes of lands were used starting with Class 1 for lands without defects that materially reduced their value under irrigation and ending with Class 5 for lands of such poor quality that the probability of any future use was regarded as too remote to justify consideration. Letter symbols were used with the class numbers to indicate the basis for the classification in Classes 2 to 5. The letters used were (1) a for shallow hardpan areas, (2) b for high alkali content, (3) c was a special class to cover the slough and channel cut lands in the valley trough, (4) d for roughness and (5) e was for general deficiencies usually for soil other than or in addition to alkali or hardpan.

This 1929 land classification served a useful purpose in the preparation of the state's plan for the Central Valley Project. Its specific use was to eliminate from the service planned under this project those lands which could not be expected to be able to pay the cost of imported water. At that time, and in the adopted plan of the state for its Central Valley Project, all types and areas of service were expected to pay their allocated costs in full. The Central Valley Project Act provided for financing the project with revenue bonds and it was specifically stated that there was not state liability for costs. For such conditions only lands able to meet their full

costs should be included in the service area.

This 1929-1930 land classification recognized similar elements to those used in later classifications by the state and the U. S. Bureau of Reclamation. It was obviously made on a much less detailed scale than has been used in recent work. It was adapted to the time available for its completion and met its time schedule.

During the past fifty years, I have been involved in land classifications of irrigable lands in numerous western areas. I was a member of the advisory board on the Northeastern Counties Investigation for the state. The board reviewed the standards of land classification then being used by the state. I was also a member of two consulting boards of the U. S. Reclamation Service on large projects in North and South Dakota. These will be discussed separately later. I think that I can properly claim familiarity with, and a part in the development of the practice of classification of irrigated and irrigable lands over the period of my activity. It is my opinion that, while it has now been superseded by more detailed classification, the 1929-30 work had a usefulness well in excess of its cost. The standards used were similar to the practice of the U. S. Bureau of Reclamation on its proposed projects. Full use was made of the U. S. Soil Surveys then available. However, a land classification for irrigation goes beyond the soil inventory of the U. S. Soil Survey and interprets the physical texture findings of the Soil Survey in terms of the economic feasibility of irrigation.

I had an opportunity to review my 1929-30 land classification in the San Joaquin Valley in 1955 while acting as one of the consultants for Bechtel in their review of the State Water Plan. I went

over the areas which in 1929-30 had been questionable to see what development had occurred since 1930. While the area irrigated from ground water had increased materially since 1930, there had been only limited increases in the areas having a ground water supply where the land had been classified in Classes 3 or lower in 1929. The area of the largest increased use on lower quality land was on Semitropic Ridge in Kern County. By heavy applications of gypsum some of these lands on slight ridges with better drainage had been reclaimed and were producing satisfactory crops. Financial accounts from which the economy of such results could be appraised were not secured and have not been included in the state's later reports on these areas. The advantage of the low price at which these lands had been acquired could well be more than offset by the costs of reclamation and the period of reduced yield until reclamation had been accomplished.

Even with large subsidies for the cost of irrigation now usual in projects of the U. S. Bureau of Reclamation, the charges for water in our remaining projects are becoming more than any but the best lands with good crop adaptability can expect to meet. A rigid classification to eliminate the lands which cannot meet such standards is an essential in these projects. From contacts in 1965 with some of the units expecting to receive water from the present state project, it appears to me that this standard has not been enforced in fixing the boundaries of some units.

BULLETIN 29

Bulletin 29, San Joaquin River Basin, (1931) of the State Division of Water Resources was a more detailed follow-up to Bulletin 25 covering the State Water Plan. Its purpose was to present results which had been condensed in Bulletin 25.

Included in Bulletin 29 as Appendix A was my land classification of the San Joaquin Valley. In addition I prepared drafts of shorter discussions of land classification to be included in the main text.

OTHER WORK ON BULLETIN 29

During the preparation of Bulletin 29, I was also asked to comment on the drafts being prepared for other portions of the report. Many of these were verbal. When a draft of the whole bulletin had been prepared I was asked to review it and comment on its contents. I did this in a rather detailed report with specific suggestions for changes.

The materials relating to my work on Bulletin 29, other than Appendix A, are in Items 51 and 149 of my bibliographical file.

My comments on Bulletin 29, other than those relating to land classification questioned some of its general tone. It was my opinion that some less favorable features of the plan had not been covered as fully as those that were more favorable. The details of these matters are in Item 149. Hyatt's letter thanking me for the thoroughness of my review is also included.

PERMISSIBLE COSTS FOR IRRIGATION WATER

During the preparation of Bulletin 29 there was much discussion regarding whether the irrigated areas in the southern San Joaquin Valley to be served by the proposed state plan could meet the costs of such

service. An office report had been prepared for the state engineer by P. H. Van Etten, dated March 25, 1931 entitled, "Economics for Initial Development as it affects the Individual Land Owner in the Upper San Joaquin Valley." I had been assembling material on my own in this field during 1930 and completed a memorandum on "What can San Joaquin Valley Lands Afford to Pay for Water," in March, 1931. I was asked to comment on Van Etten's report and did so in a report on "Price Land Owners can Afford to Pay for Direct Benefits of Service from Proposed Immediate Initial Unit in the San Joaquin Valley of the Comprehensive Plan." This report was dated May, 1931. Both of these reports are in Item 51 of my bibliographical file.

Frank Adams had also prepared Bulletin 34 for the Department of Water Resources entitled "Permissible Annual Charge for Irrigation Water in Upper San Joaquin Valley." He used the difference between all costs except water and the gross return to derive the net return available to use in paying for water.

At that time average gross crop returns were about $100 per acre and costs, except water, about $90 per acre, leaving about $10 per acre available for what is now called the "repayment capacity."

Crop prices varied materially in the late 1920's. A variation of 10% in the gross returns could make 100% difference in the repayment capacity.

I based my conclusions largely on the costs of water which were being incurred and met by the existing uses. This included the costs that were being incurred for ground water pumping. It was recognized that citrus could pay a higher rate than other crops

but a price differential based on the crop on which the water was used was not considered to be workable.

The resulting prices that could be paid for water varied with the assumptions that were made. In general $3.00 per acre foot canal side appeared to be as high as could be secured for the dependable supply. A lower rate for recharge and off season water was also discussed.

Some years later when the USBR fixed its rate for CVP water it used $3.50 per acre foot for Class 1 or dependable service water and $1.50 per acre foot for Class 2 or irregularly available water. This somewhat higher rate is consistent with the improvement in economic conditions which had occurred when the USBR rate was set.

These 1931 rates discussed in Bulletin 29 have been made obsolete by the inflation and other factors since the 1930's. They are in marked contrast to the ability to pay rates now in use by both the USBR and the state. The method of using the difference between the average gross crop returns and all costs except water is still in general use. The state derives its results by adopting a crop pattern for the area being considered and deriving the costs and returns for each crop in this pattern. The USBR is using a similar general basis except that it is applied to farm units selected to be typical of the expected practice in the area. In general the USBR results are somewhat lower than those of the state. This is to be expected as the USBR necessarily bases its farm programs on units not exceeding 160 acres and loses the economic benefits that result from larger farm units for many crop conditions.

GIN S. CHOW vs. SANTA BARBARA

217 Calif. 673 (1933)

This case was brought by a group of riparian owners on the Santa Ynez River to enjoin the proposed enlargement of the Gibraltar Reservoir which was above their riparian lands. The original storage at Gibraltar had become prescriptive against these owners. Santa Barbara proposed to increase the storage capacity at Gibraltar; such increase storage had not been built or used.

These owners sued to enjoin its use before public use had occurred. Such public use would have limited the recovery of the lower riparian owners to damages.

James Peck was the attorney for the riparian owners. H.H. Henderson of Stockton was his engineer. Peck and Henderson had secured contingency fee contracts with some forty riparian land owners who were joined as plaintiffs. The contract provided that Peck would pay the costs of the trial to be reimbursed from the first awards that might be secured. He was also to receive a percentage of any excess of the awards over the costs. To protect themselves in their collection under these contracts Peck had recorded them. Henderson was named to share in the awards also.

James Irving of Riverside was the principal attorney for Santa Barbara and Raymond Hill was the directing engineer. The case went to trial in 1929. The witness who prepared the testimony on the character of the riparian lands did not present an adequate classification of their irrigability and I was asked to examine each ownership of these lands and testify regarding the value of the flow of the Santa Ynez River for their irrigation. This involved

a classification of what part of these riparian lands was irrigable and the feasibility of its irrigation with the available stream flow. Much of these lands were on mesas or terraces above the stream and the feasibility of pumping to the necessary elevations was a factor in their irrigability.

The flow of the Santa Ynez River then available to these lands consisted of that remaining after the past diversions by Santa Barbara. Gibraltar Reservoir controlled all of the flow at its dam except some excess winter run-off not useful for direct irrigation.

The trial was under way in October, 1929 when I began the field work. I was teaching in the University. I had to commute on week ends for field work going down on the night train to Surf, being met there about 5 A.M., working Saturday and Sunday in the field and coming home on the Sunday night train.

I testified in this case on November 14 and 15, 1929. On cross examination Peck asked questions regarding the character of the land of each of the plaintiffs. I had my notebook at hand and could glance at it before answering. The judge had the aerial photos of each piece before him as I testified and checked my answers as I made them. This worked well until I had covered all but 4 or 5 of the areas. Then Peck insisted that I answer from memory without referring to my notes. Irving protested and the lawyers argued for some time before the judge ruled that if Peck insisted on a memory answer he was entitled to it. If my memory was incomplete or in error it could be taken care of on re-direct examination.

While the lawyers were arguing this matter I was busy

memorizing the descriptions of the remaining ownerships so I did not care which way the judge ruled. It was not necessary to use re-direct examination on the descriptions.

When Henderson undertook to testify both as a direct witness on his field work and as an expert in expressing opinions,he was challenged as being an interested party as a result of his interest in the contingency contracts. He was disqualified as an impartial expert but was permited to testify on factual matters without interpretation.

The account of the testimony in this case is interesting rather than important. This was a contested trial that lasted over 6 weeks. Peck did not pay his share of the court reporters charges. The reporter sued the plaintiffs and collected. Peck should have paid those charges under the terms of the contingency contracts. This result caused the expected dissension between the plaintiffs and their attorney.

The lower court judge decided in favor of Santa Barbara and denied the injunction against raising Gibraltar. The plaintiffs appealed. The decision of the California Supreme Court on the appeal in 1933 sustained the lower court.

The trial in this case occurred after the 1928 constitution ammendment had been passed but before it had been construed by the supreme court. This case was the first to reach the Supreme Court in which the 1928 ammendment was at issue. The court sustained the ammendment holding that all use of water in California was subject to reasonable standards of use. The plaintiffs in the Gin Chow case were found not to meet such a standard in the riparian usage they could make of the available flow of the Santa Ynez River.

Later cases have fully established the 1928 constitutional amendment as applicable to all types of use. This has effectually met the previous disadvantage of appropriators in contests with riparian owners.

UNION SUGAR COMPANY CASE

The plaintiffs in the Gin Chow case owned lands above Robinson's Bridge. Another separate suit was brought by land owners in the Lompoc Valley. The Union Sugar Company was the first named plaintiff in this suit. The cause of action was the reduction in the recharge of the ground water in the Lompoc Valley that it was claimed would result from additional storage of the run-off of the Santa Ynez River.

In July, 1930 I made a classification of the lands involved and prepared a report in November, 1930 entitled "Progress Report on Irrigable Area and Water Requirements for Consumptive Use for Lands on Santa Ynez River and Tributaries." This is Item 148 in my bibliographical file. The field work for this report was done in the summer of 1930 when I could devote more nearly continuous time to it and did not involve the commuting of the Gin Chow case.

This case never reached trial. In the construction of the Cachuma Project the U.S. Bureau of Reclamation agreed to a schedule of releases for recharge in the Lompoc Valley which should remove the cause of action of this suit. This is a commendable result. There should be no further use for my 1930 results in litigation. They may supply a useful inventory as of 1930 for use in comparison with the development at later dates.

THE STATE LAND SETTLEMENT COLONIES

When Elwood Mead returned from his work in Australia and became Professor of Rural Institutions at the University of California, he proposed that California should undertake land settlement colonies similar to those he had administered in Australia. As a result of his energy and influence, California established a Land Settlement Board in 1917 and bonds to provide funds were voted. Mead became Chairman of the Board.

A search was made for suitable areas for colonies and a part of the Stanford Ranch near Chico was selected for the first. This became known as the Durham Colony as Durham was the nearest town to the area.

When the Durham colony was opened for settlement in 1918 there was an active demand for land. The states program had been widely publicized and the units sold quickly. The progress at Durham resulted in an additional bond issue and a search for a second colony. Delhi was selected and opened for settlement in 1920. The land demand had slackened and only part of the units sold readily. The rest moved slowly and the class of settlers accepted was not equal to that at Durham.

Progress at Durham was generally good during the 1920's. These were good lands secured at favorable costs for land and water. At Delhi the lands were sandy and more difficult to subdue. The Delhi lands had been purchased at what was then a relatively high price for this type of land. A concrete pipe distribution had been constructed, also at a relatively high cost. The Delhi settlers were faced with these high total costs with similarly high annual

costs. The production of these lands in the early years of operation did not provide sufficient net income to meet the annual payments.

By 1925 the Delhi Colony was in financial difficulties. It had become evident that some adjustment was required. The Legislature in 1925 approved a partial write-off. This helped but did not remedy the basic difficulties of the colony.

The State Land Settlement Board had consisted of members not otherwise employed by the state. This type of Board was used in the earlier years of colony purchase and establishment. Later the Board was changed to consist of the State Directors of Public Works, Agriculture, and Finance. Administrative control was placed in a Division of Land Settlement in the Department of Agriculture. Chas. W. Cleary was Chief of this Division. He had been a member of the Legislature. Cleary was capable and conscientious and did all that anyone could do to bring the colonies out of their troubles.

In 1928 the members of the Land Settlement Board were Bert B. Meek, G. H. Hecke and Alex R. Heron.

When the problems relating to Delhi and Durham became acute in 1928 it soon became evident that the members of the Land Settlement Board did not have time to give them the attention which they needed. This condition is inherent in any attempt to get additional service from existing state officers who are already fully occupied with their main functions.

Cleary being in the Department of Agriculture had a direct contact with Mr. Hecke and could keep him more fully advised regarding his work. The other two members of the Land Settlement Board felt the need for a closer contact than they had time for themselves

and desired someone reporting to them to participate in the details of any plans that might be proposed. Mr.Meek first used the State Engineer, Edward Hyatt, for this. Hyatt asked me to help him. Gradually I came to report more directly to Mr. Meek and eventually practically to hold his proxy on the Board for matters leading up to official action by the Board. Mr. Heron used one of his accountants, Mr. Rouble, in a similar capacity for the Department of Finance. Mr. Rouble limited his activities mainly to auditing accounts. Cleary and I had the main work to do on developing proposals for adjustment.

I had followed the activities of the state in these two colonies fairly closely and with much interest from their beginning but had not had any direct part in them. Elwood Mead was responsible for the program and dominated its execution. As he was on the University faculty, use was made of other faculty members. Charles Shaw made reports on the soils of tracts proposed for purchase. Frank Adams was active in assistance to Mead. David Weeks came to California because of his interest in aiding such settlements and worked on the program. Weeks later joined the faculty.

These colonies received wide publicity and were hailed as the answer to giving settlers of limited means a chance to secure a farm of their own. They were expected to set a model in this field which would be compared with the results that were being secured in land development under private practices.

When I began active work on these colonies in January, 1929, it was apparent that the main problem was at Delhi. Durham was insisting on a reduction in their indebtedness to the state if adjustments were granted to Delhi but the Durham settlers were not in the distress of many of those at Delhi. All of these procedures

took place prior to the adoption of the extensive relief practices of the federal government which were inaugurated in the Depression of the 1930's. Settlers unable to meet their state payments had no alternate except to become delinquent. The state had not enforced foreclosure although some settlers who could see no chance of becoming solvent had moved to other areas.

It soon became evident that adjustments could not be made equitably on a uniform basis using average conditions. Each settler was a separate case. To have reduced the remaining indebtedness by some uniform percentage for all settlers would have penalized the individuals who had struggled to maintain their payments. All proposals for adjustment had to be worked out individually to determine what their effect would be. As there were about 230 active accounts at Delhi this was quite a burdensome job. The work of making those individual studies fell to me. The proposed plans were given letters to designate them. We worked our way down the alphabet. The final settlement was based mainly on Plan W.

The state had provided agricultural advice which was carried to the point of approaching agricultural management of the individual settlers farm plan. The planting of peaches was recommended and there was a substantial acreage of this crop. It was found that those trees on the sandy soils of Delhi were subject to little leaf. The settlers claimed that the state should repay them for the costs they had incurred on these orchards as they had been planted on the state's advice. Cleary and I rejected this claim and were supported by Hecke and Meek.

Among the settlers at Delhi were a group of disabled veterans.

These were able to operate their farms. One was reported to have won the county wrestling championship of his weight. This group claimed that they should receive special consideration. This was a touchy subject politically. When it was under discussion Hecke told me that any plan that did not give this group what they asked for would be political suicide. Not being subject to political pressure, the disabled veterans were treated the same as other settlers in all of the plans on which I worked.

E. G. Adams of Merced was the assemblyman from the Delhi area. He was active in seeking adjustments for the Delhi settlers. As any settlement resulting in loss to the state would be brought before the legislature for review and possible change, it was necessary to consider the legislative reaction to any plan that might be proposed. It was considered that the best chance of legislative approach would be secured if any plan proposed was equitable as between individual settlers and could be supported on its merits. There was no legislative interference in the work preparing the plans for settlement of the indebtedness to the state. The first work which I did on Delhi and Durham was to make a preliminary study on the overall conditions in each colony. Based on my conclusions from this work I was asked to undertake further work. This began Jan. 14, 1929 and was actively pursued until May, 1929. Matters then became dormant until September, 1929, when negotiations with the settlers became active. Work on my part was intermittant from September, 1929 to April, 1930. By this time the negotiations had become political and I dropped out as my work was no longer useful and I had no desire to participate further. The final terms were worked out by the Board.

I made no formal reports in my work on Delhi and Durham. Some memoranda were prepared for my own use which have not been typed. Conclusions are stated in some of the correspondence. These with some other pertinent materials are collected in Item 150 of my bibliographical file. This item differs from nearly all of the items in this file in that it does not contain a formal statement or report. There was no need of a complete report during my work as we proceeded on a day to day basis seeking an acceptable form of settlement. Also after settlement had been accomplished the terms of settlement spoke for themselves.

The published material relating to these two colonies is extensive. Their history has been the subject of a doctoral thesis at the University. There is no need of repeating such available material here. The following discussion relates mainly to my own part in getting the state out from under its obligations to the settlers in these two colonies. Instead of the usual adjustment of indebtedness where the debtor seeks a compromise representing what he can afford to pay, the adjustments became a matter of the best terms for the state which the settlers would accept for their remaining obligations to the state.

The difference in the conditions in the two colonies makes their separate discussion desirable. This had been done.

DELHI

Although this was the second colony it determined the policies relating to state action and is more readily discussed first.

When the Land Settlement Board sought an area for its second colony some 80 locations were offered. The Board narrowed this list to four for final decision. One of these was Miller & Lux lands at

Buttonwillow, now largely the Buena Vista Water Storage District. This was rejected because Miller & Lux wanted to sell a larger acreage than the Board was able or willing to buy. Another site was in the Holland tract in the Delta. This was rejected reportedly because one member of the Board objected to putting a colony behind a reclamation levee with its possibility of a break. The third tract in the final list does not come to mind, I think that it was another delta area. The Wilson land in the Turlock Irrigation District was finally purchased.

The results in seeking the second colony site illustrate the general land situation in California in 1920. While some 80 tracts were offered, the Board found only four that met their needs to the extent that involved final consideration. By 1920, attractive areas of 4,000 to 8,000 acres in one ownership having good soil and available water were generally developed and in use. The Board indicated that it would like to place its second colony in southern California but found no tracts there suited to its needs. Much of the land development in California had been aided by the availability of tracts in one ownership resulting from the land grants of the Spanish and Mexican governments. The attractive land grants were generally in use by 1920. The effort of the State to find a site for the second land settlement colony in 1920 practically marked the end of the colony land development practice for irrigated land in California.

The State bought 8,600 acres at Delhi at an average price of $96 per acre. The Report of the State Land Settlement Board of Sept. 30, 1920, states (p. 26)

"The soil experts of the University reported that

this area is suited to intense cultivation both for farm and orchard products. Its lack of development and the price at which purchased was due to the sandy and broken character of the land, making it difficult to prepare for irrigation and hard at the start to grow crops. The Board's initial difficulties illustrate this."

In my work for the state I went into the early reports and records. I found that the soil report of Prof. Shaw and his recommendations were based on the purchase of somewhat better soils than those in the area finally acquired.

The Delhi colony was located on an area in the Turlock Irrigation District which had had water available for many years. While other areas in the District had developed, this area had remained unused. There was some development on similar soils around Ballico near Delhi. This had been settled by Japanese. They had succeeded there by low initial investment, hard work and a restricted standard of living during the development period.

There had been other areas in which the irrigation of similar lands had been undertaken prior to 1920 from which much could have been learned. Such areas included the Umatilla, Minidoka, and Sunnyside Projects of the U.S. Reclamation Service. The results on sandy lands in these areas, if known and used, would have caused caution to have been used in undertaking a colony at Delhi.

Experience prior to 1920 and since has shown that sandy lands can be successfully irrigated under proper conditions. A period of reduced yield is usual while the soils are being built up. Initial investment must be relatively low to keep annual costs down during

the early years. Delhi invested the cost of full development before the land was sold to the settlers and the high fixed charges in the early years were in excess of what could be made from the land. There was experience available in 1920 from which the later results at Delhi could have been predicted.

Another factor at Delhi was the pipe distribution system. The irregular elevations of the land made a pipe system desirable. One was planned with adequate sizes for good service. As a result of the shortage of funds the concrete pipe system built had reduced sizes and could not deliver efficient sizes of irrigation heads in much of the area.

A factor contributing to the failure at Delhi was the extent of advisory services supplied to the settlers. This service approached the control of the decisions which should remain with the land owner. The state could exercise such controls as a condition in loans that were needed. In 1920 farmers generally had been pioneers and above the average in their self-reliance. Many of the settlers lacked farming experience and needed advice. By the late 1920's many of the settlers had lost their own initiative and expected the state to solve their problems.

DURHAM

The Durham colony was generally good land with an adequate water supply. Some hardpan land which it had been necessary to acquire in order to secure the area desired for the colony was sold in large farm sizes and was not a part of the colony. The colony made good progress until 1929. It had been widely hailed as the answer to the problem of close settlement where owners of limited financial resources could secure a farm under favorable payment terms

with helpful guidance and advice by the state. The colony was visited by many from other states and countries having land settlement problems. In its earlier years, Durham lived up to its advertised standing as a model colony.

Durham started under the local management of Geo. Kreutzer. He had gone to Australia with Mead and had returned to the United States to take part in his land settlement projects here. Kreutzer had established himself in this field and had a reputation of his own in it. He was one of the few and perhaps the only one who had acquired standing for himself while working for Mead. Mead was inclined to take credit for the accomplishments of those working under him. It was a complaint by those who had worked for the Irrigation Investigations of the U.S.D.A. while Mead was its chief, that Mead received the recognition resulting from their work. This was not the case, however, where Mead desired public standing for the reports such as Bulletin 100 on Irrigation in California. In Bulletin 100 each area covered was reported under the authorship of some one having recognized standing here. It was also not the case when Mead became Commissioner of Reclamation and inherited a staff which included many already having established reputations of their own.

Walker Case

One of the settlers at Durham had bought a released unit sometime after the first settlement of the colony. This unit had been sold to him by Kreutzer. This settler, H.M Walker, later brought suit to recover his expenditures and also damages from the state on the grounds that there had been fraud in the representations made to him by the state's agents. This case

came to trial while I was working on the adjustment of payments and I was asked to prepare testimony for the state on the merits of this case.

I made an examination of the Walker unit, reviewed what had occurred in the sale and prepared expert testimony in the case. The plaintiff's case came first. Walker testified making bitter charges against Kreutzer and his honesty. Mrs. Walker also testified, fainting while on the stand. At the time I regarded this as a stunt designed to influence the jury. Several of Walker's neighbors also testified charging Kreutzer with having known facts about Walker s unit which he did not disclose at the time of sale. The trial lasted about two weeks. I sat through most of it. It was pitiful to have to sit there and watch its effect on Kreutzer. He had put in some of the best years of his life trying to help these same people who now turned on him in an effort to help one of them secure damages from the state. Kreutzer was so depressed that he would hardly talk to anyone during the time out of court. He died shortly afterward. His case represents the nearest to dying of a broken heart of any that I have encountered.

The Walker land had some drainage problems which could have been solved. These were explained to Walker before he bought. I testified regarding his land, supporting the value at which it was sold to Walker. I had expected an attack on my testimony in the cross-examination and was prepared to meet it. Instead, Peters, Walker's attorney, tried to get me to agree that I was the leading authority in this field in the United States. I contended that I was qualified, as I had to do to support my testimony, but refused to say I was the best. This is the only time in my experience where

an opposing attorney tried to increase my qualifications.

When the case reached argument to the jury, Peters reviewed his fulsome praise of my qualifications. Walker had had no expert witness. Peters pointed out this difference and began his arm waving. Here was the great and rich state able to afford to bring the greatest living authority into the case in their support while the poor settler could only afford to rely on the voluntary testimony of his neighbors. Needless to say I did not become elated at his praise. Peters probably had the case on a contingency basis and did not want to incur the cost for experts on his side.

As expected the jury gave Walker a substantial award. The case was appealed and reversed. It was not retried.

CLEARY'S FINAL REPORT OF JUNE 30, 1931

The results of the State's experience in its venture into supervised land settlement are reviewed and analyzed in the Final Report of the Division of Land Settlement dated June 30, 1931 by Chas. W. Cleary, its chief. It is not essential that these details be repeated here as this report is generally available. The accepted loss to the state in 1931 on an investment of almost $3,100,000 was about $2,500,000. This represents a loss of almost 80% of the investment.

Mr. Cleary's conclusions regarding the practicability of state sponsored land settlements such as those at Delhi and Durham are well expressed in his final report (p. 18, 19). He states:

"The land settlement venture has apparently well demonstrated that anything that offers a substitute for or

> that tends to weaken individual effort and initiative to that extent promotes failure in individual enterprise and dissatisfaction in community activity. The conclusion is unavoidable that few human beings are fashioned from sufficiently rugged fiber to withstand the weakening influences of paternalism; that few can resist the temptation to lean too heavily on a paternal government where the opportunity offers. Strong personalities were manifestly weakened by the years under State land settlement operation."

This statement was made in 1931 based on his experience in managing the Delhi and Durham colonies during the period of their liquidation. This was prior to the extensive forms of general relief established during the Depression and now rampant in the Great Society and the War on Poverty. Human nature does not change basically and Cleary's comments in 1931 are applicable today.

RESULTS AFTER 1931

Delhi and Durham have been on their own now for over thirty years and the record to date enables comparison of results under the colony system of the State with those upon operating on their own responsibility.

After the 1931 adjustments had been completed the further administration of the colonies was placed with the Division of State Lands, Department of Finance. This office handled all state lands at that time. There were some unsold lands and the state held some mortgages. Where the mortgages remaining on the settlers

units qualified for Federal Land Bank loans, such loans were placed on the land and the State received payment.

The largest area remaining in the title of the state was the part of the Delhi Colony which had not been subdivided or sold. An office was maintained in Delhi to dispose of this and other lands there. Governor Rolph appointed the father of his daughter-in-law to have charge of this office.

I have not seen any final accounting for these two state colonies after all accounts had been closed. All indebtedness to the state that remained in 1931 should now have been fully paid. Such a final accounting would show the extent to which the state actually realized the assets remaining after the 1931 adjustments. The gross returns less the continued cost of administration may have been relatively small.

At Delhi, a local improvement district had been organized to take over the distribution system of the colony. Such local districts within the Turlock Irrigation District were numerous. The Turlock Irrigation District put in some irrigation wells in the colony area to augment the limited capacity of the state's concrete pipe system. The Turlock Irrigation District also treated the land owners in the colony the same as any others. They met their charges and district taxes or suffered the same penalties as other landowners. R.V. Meikle was the manager of the Turlock Irrigation District and gave the colony the same service that other areas received. Meikle has told me on several occasions that the colony area was required to meet and has met the same rules that apply throughout the district and has not caused any special problems in district operation.

At Durham, a mutual water company was organized and each settler received stocks for use on his land. This company has also operated without unusual difficulties since 1931.

Over the years since 1931 I have occasionally driven around in the colony areas for general observations. I drove over both areas in 1965. In general appearance both areas are not different from adjacent similar lands. The present buildings in the former colonies are as modern and as well kept as in other areas. Overall both areas indicate a degree of prosperity fully as great as other areas in their vicinity.

The settlers at both Delhi and Durham have benefitted by getting out from too close control by the state of the matters which the individuals should decide for themselves. When their responsibilities were returned to the settlers they have shown the same ability to meet them that is shown by farmers generally.

GENERAL COMMENTS

The preceding discussion has covered my participation in the adjustments at Delhi and Durham with some general comments. My part in working out the results of various plans that were proposed was primarily directed toward advising Mr. Meek regarding policy decisions he needed to make as a member of the Land Settlement Board. I worked closely with Mr Cleary but participated to only a limited extent in the actual meetings with the settlers committees. Mr. Cleary did not mention my part in the final results in his final report. Such mention was not essential to the purposes of his report.

When I began my work for Mr. Meek it was recognized that major losses to the state at Delhi were unavoidable. It was hoped that

such losses at Durham could be kept within reason. My function was to advise Meek whether the various plans proposed were equitable to the state and between the individual settlers. It was recognized that to be successful any plan would have to have the approval of a high percentage of the settlers. It was also hoped that a plan could be secured under which the state could recover such part of its investment as the settlers could afford to pay.

I had the full support of Meek during all of my work on these colonies. He stood for the above basis in the meetings of the Board. The recognition of the other two members of the Board that Meek would not agree to an inequitable adjustment between individual settlers or for the state probably aided in securing more equitable terms for all parties in the final agreement than would otherwise have been obtained.

Mr. Hecke generally followed Cleary's recommendations but was inclined to regard getting a final settlement as being more important than holding the settlers for what they could reasonably pay. Mr. Heron appears to have had political plans for himself, and to have been more interested in the publicity he could secure. At some meetings he proposed some newsworthy plan that might occur to him just before the reporters had to leave to make their afternoon editions. This would be used in the papers and credited to Heron, although it might have been something that had been considered and discarded by the rest of those representing the state. Heron was not available for the pre-meeting sessions at which policies to be followed were worked out.

The settlements finally made at both Delhi and Durham were the result of the ideas and work of many individuals. No one individual

was responsible for it all. Mr. Cleary deserves the largest amount of credit for the results. He worked long, ably, and patiently on the settlement finally achieved. I would give Mr. Meek the second place in credit for the results. An assist should be given to Governor Young who stood behind the Board and resisted pressure to write-off all indebtedness to the state. Elwood Mead who was responsible for the settlement program was not around when the going got tough.

My part in this work may have had some effect in securing somewhat more favorable terms for the state in the final settlement. The procedures were kept from getting out of hand until the final negotiations were reached. When Plan W had been accepted at Delhi and was ready to be submitted to the Legislature some further concessions were made to secure favorable action. These were political in which I did not care to be a party and I terminated my work prior to the final terms.

The 1931 adjustment of the finances at Delhi and Durham represents the penalty the state paid in order to be relieved of further obligations to these colonies. The price paid by the state was high. The price paid by many of the settlers in lost savings, lost years, and lost ideals was also high. An adjustment on any terms was better than further effort to operate on the colony basis. It is my opinion that both the state and the settlers gained by the state's purchase of release of its obligations in the 1931 adjustment although the terms were relatively liberal to the settlers.

The 1931 adjustment of these colonies was based, as it had to be, on judgment reached at that time. At present hind sight can be applied to its terms. This adjustment was made at the start of

the depression of the 1930's but before its relief measures had been put into effect. If Delhi and Durham had remained a state responsibility in the 1930's there would have been a demand for major relief for the support of the settlers. The cost to the state of such relief would have been high. While the extent of the coming depression was not realized in 1931, the state was immensely fortunate in being able to complete these adjustments before the full impact of the depression was felt.

The 1920's were regarded as less favorable to agriculture than previous periods. Crop prices declined after World War I. Looking back now, the conditions in the 1920 s were not so bad for agriculture as they have been at some times since. If Delhi and Durham failed in the 1920's, colonies operated on similar theories could not have been expected to succeed at any later times.

Various explanations have been offered regarding why Delhi and Durham failed as supervised colonies. Some have said that it was due to Mead's having gone to Australia again in the 1920's and to his successors not being able to manage the colonies successfully. Others have claimed that it was the result of the unfavorable attitude of C.M. Wooster while he was chairman of the Land Settlement Board. It is my opinion that the failure of these colonies was not the fault of any individual and that no one could have made them a success. Additional state funds to pour into the colonies would have prolonged their life, but would not have resulted in their success.

It is my opinion that the failure of Delhi and Durham was the result of attempting to replace the individual initiative of the settlers by managed direction. Such controls replace the responsi-

bility of the individual and lead to his loss of ability and interest. The American type of settler was not adapted to this practice 50 years ago. It is my hope that he will never become adapted to it.

It is my opinion that Delhi and Durham would have failed sooner or later regardless of the individuals in charge in the Land Settlement Board or on the colonies and regardless of their physical advantages in soils or crop adaptability. While the poor land at Delhi accelerated it failure, the good land at Durham only postponed its fate.

The experience of the State in its two land settlement colonies in the 1920's has had at least one benefit. It has been effective in preventing the state from again undertaking similar projects. If the type of settlement in these two colonies could not succeed in the 1920's when self-reliance was still the American tradition it could not be expected to succeed today under the present policies of free assistance. If Delhi and Durham can continue to keep the State from undertaking similar ventures in them, the losses of the State in these colonies will have been well repaid.

In the concluding paragraph of his final report, Cleary has expressed the above thought very clearly. He states:

> "If because of the lessons learned in State land settlement the citizens of California are led to scrutinize more carefully in the future idealistic theories proposed before adopting them as functions of government the expense involved in the land settlement venture will have proven a good investment."

PROPOSED SUTTER IRRIGATION DISTRICT

In August, 1931, I began an investigation for an irrigation district in the Peach Bowl area of Sutter County. This district would have extended from the area served by the Sutter-Butte Canal on the north to the Tudor area on the south and from the Feather River on the east to the rice lands on the west. About 26,000 acres were canvassed for their use of water and their crops. The source of water supply was the underlying ground water.

At this time, B.B. Meek was the head of the California Lands Co. which had been organized to handle the lands owned by the Bank of America. The bank had acquired much land by foreclosure and had established a separate company to handle it. Mr. Meek had urged that such an investigation be made. A committee of the land owners had been formed to sponsor this work. On Meek's recommendation I was employed to make the investigation. Some previous promotional work had been done in this area by Milo Williams but no action had been taken.

The Bank of America paid half the cost and the other land owners raised the other half by voluntary contributions. Mr. Dunning Rideout of the Rideout Branch of the Bank of America in Marysville was chairman of the committee and all funds passed through his hands.

I went over the area on August, 1931, and named a lump sum price at which I would do the work. This was accepted and an agreement drawn. I employed C.R. Loucks to make the field canvass of the existing pumping plants and crops. Loucks had worked for Harry Barnes of the Madera Irrigation District and for the San Joaquin River W.S.D. My report was completed in November, 1931. Some field work was also

done by W.A. Laflin.

This work represented a standard type investigation of sources of supplemental water supply for an area that was concerned with the effect of its draft on its underlying ground water. There were alternate sources of water supply that might be secured. Distinctive local features were the relatively flat slope of the land so that some booster on a concrete pipe systems would have been needed to provide adequate grade. Below a depth of about 200 feet salty water was encountered in some areas. This appeared to be residual water retained when this area was a part of the ocean.

As the result of these investigations I recommended the organization of a 22,000 acre irrigation district with local improvement districts to meet the conditions in the different parts of the district. This would have met the estimated overdraft at relatively low costs. Nothing was done toward the organization of such a district.

My main report was dated November, 1931. This is Item no. 53 in my bibliographical file. A summary of this report was prepared Dec. 15, 1931. The state read the ground water elevations in 1932 and I prepared a memorandum on these results in February, 1933. These two items are in Item 54 of my bibliographical file. In 1948, when the state was making its investigations for a state water plan, I made available all of my results for their use. This gave the state the records in 1931 to compare with conditions in 1948.

An interesting and to me an amusing part of my agreement covering this report was the insistence of the committee that I should prepare the report in terms that were understandable by laymen. This was a clause in the agreement. I did not know how

this provision would be enforced as I knew of no standards by which the ability of laymen to understand could be defined. However I was not concerned over this clause as the members of the committee were all intelligent operators and if my report had not been understandable by them the fault would have been with my writing of the report.

This area has continued since 1931 with only limited local additions to its water supply. The water rights on Feather River in this area were not well defined and shortages in diversion would probably have occurred in some years. At present with Oroville Dam under construction and the preference to areas of origin, adequate water should be available for this area. It can participate in the state project if it desires to secure additional water.

The work I did in 1931 for the area was one of the earlier studies of ground water conditions for areas in the Sacramento Valley. The problems here were not critical and the areas have operated successfully since 1931 without undertaking any major works. The report in 1931 had value in excess of its costs to the landowners in supplying them with detailed results regarding their conditions and needs although it did not lead to any specific actions in securing additional water.

OAKDALE IRRIGATION DISTRICT

In May, 1931, I made a report for the State Bond Certification Commission on a proposed bond refunding program for this District. This report is Item 52 in my bibliographical file.

The Oakdale Irrigation District with the South San Joaquin Irrigation District were the first larger districts to be organized and built under the revised irrigation district act. They both diverted from the Stanislaus River. Their distribution systems were built about 1915 and later they built joint storage at Melones. Under the Irrigation District Act, the bond issues of these districts were subject to approval by the Bond Certification Commission. In 1931, the Oakdale District had sold general bond issues totaling $2,400,000 and an issue of $1,100,000 of storage bonds to which the net income from power produced at Melones was pledged.

The first maturities on these bonds began in 1931. The district had met its interest charges to date but was concerned regarding its ability to meet its approaching bond retirement schedule. It proposed to refund its earlier issues so as to postpone maturities. My report related to the ability of the district to meet its prospective costs.

The Oakdale Irrigation District contained about 72,000 acres. Only about 30% of this area was irrigated in 1931. About 60% of the district consisted of hardpan lands, generally rolling with shallow soil. Ladino clover was being tried in a preliminary way on some of these lands. The main irrigation was on the other district lands which were of good quality.

The principal problem of the District related to its hardpan lands. Taxes on these lands through the 1920's had been met although only limited irrigation had been developed. By 1931, the speculative conditions of the 1920's were over and, many of these land owners, even if willing, would not have been able to continue to meet the district taxes.

I went over the District's program and policies and worked out a basis on which I concluded it might meet its outstanding bond requirements. This included increased taxation in Oakdale which was included in the district, postponement of some improvements, and higher relative taxes on the better soils.

At the time of my report the extensive program later adopted by the Reconstruction Finance Corporation for refinancing irrigation districts was being discussed but had not become operative. Also at that time, the preference of the Malones storage bonds on the power earnings was in effect and this income could not be used to meet charges on the earlier bond issues.

My report was not favorably received by the district. By the time it was available, refunding district bonds at a lower rate of interest and reduced principal had become a hope. The Oakdale District became in default on its bonds and was later refinanced by the R.F.C. Also later the courts found the preference of power bonds on power revenue invalid.

My report on the Oakdale Irrigation District represents one of the last efforts to maintain the integrity of the outstanding irrigation district bonds. It failed in the face of prevailing conditions. In my opinion, the will to meet their bond charges was largely lost when relief became available. Undoubtedly many

districts could not have met their bond payments under the later extended period of depression. This depression also created the desire of the bond holders to get a quick settlement on whatever terms they could secure rather than to hold unproductive securities for a long period of recovery.

BERKELEY OLIVE ASSOCIATION

The following account of my experience with the Berkeley Olive Association's procedures before the California Railroad Commission has little historical interest or importance. It represents the results of an engineer in proceedings usually performed by the lawyer. The results approach a comic opera situation. I enjoyed the experience and accomplished some results useful to the Association.

The Berkeley Olive Association was formed by a group of owners of olive orchards west of Oroville. The tract had been promoted and the land sold by B. B. Meek. The owners were largely faculty members at the University of California and the University of Nevada. Among Berkeley members were Etcheverry,Hyde, Minor, Plehn, Leuschner, and Hatfield. I had known about their property but had had nothing to do with it until after the 1931 dry season.

In 1931, the deficiency in run-off had resulted in limitations on the irrigation supply received by the Association. They were a contract user under the Powers Canal which also supplied municipal service to Oroville. The Powers Canal was a public utility which had been owned by the PG&E and sold to the California Water Service Co. in 1927. This canal received its supply from the Miocene Ditch.

When the B.O.A. could not secure satisfactory results in their complaints over their service, they asked me to make an investigation and report on their water supply and water rights. I started this work in November, 1931, and my report was completed in February, 1932. It is Item 55 in my bibliographical file.

The canals in this area had been built for mining purposes. Water was diverted from the West Branch of the North Fork of the Feather River. The Hendricks Ditch diverted to Butte Creek to supply the De Sabla and Centerville power plants on Butte Creek. The Miocene Ditch supplied the Lime Saddle and Coal Canyon power plants. The Powers Canal received the discharge of the Coal Canyon power plant. It served a few irrigation users, including B.O.A. in route to Oroville for municipal use.

All of these systems had been owned and operated by the PG&E. In 1927, the PG&E sold a group of the municipal water systems which it owned to the California Water Service Co. The Oroville system was included in this group. This sale included the entire Powers Canal and all service from it.

In my report I recommended seeking to settle the differences involved first by negotiations, second by procedure before the California Railroad Commission and third, if necessary, by litigation in court. I also recommended submitting my report to the attorney of the B.O.A. for an opinion on the legal issues involved. This was done. The attorney was Stephen Downey of Sacramento.

No settlement by negotiations was reached and the attorney was directed to prepare a complaint to bring the controversy before the R.R.C. As this complaint would be based primarily on the facts regarding the water supply and service I was asked to make the preliminary draft. I did this, it was reviewed by Downey, rephrased and filed on July 1, 1932. It became Case 3292, the B.O.A. vs. the California Water Service Co. and PG&E.

In the usual course of such procedure it was set for hearing

on Sept. 20, 1932 at Oroville. I continued my preparation of testimony for this hearing.

Shortly before the date set for the hearing Downey fell from a horse and received a severe bump on his head. He could not conduct the case at the date set. I was asked to appear both as the representative of the B.O.A. and to testify in the hearing. It is not necessary to be a member of the bar to appear before the R.R.C. although it is a big advantage in most cases.

I had little choice except to accept. It had been set before an examiner along with three other matters. The examiner had told me that the B.O.A. matter would come up last. I was sitting in the hearing room not expecting to be reached until noon when the hearing was called to order at 10 a.m. To my surprise the B.O.A. case was called first. Before I could start my presentation the attorneys for the PG&E and the California Water Service Co. got the floor and made a motion to dismiss the B.O.A. case on the grounds that its complaint was defective. These claimed grounds were mainly procedural. I had only general knowledge in this field and was not sure whether they were giving me the works or whether they had merit in their claims. When I got a chance I argued against the motion the best I could, keeping going in an effort to prolong the argument until noon when I could get some legal help.

The PG&E had induced several other attorneys to appear in support of their position. These included the San Francisco attorney of the U.S. Power Commission who appeared in behalf of the water supply of the Plant Introduction Garden at Chico. This Garden used some West Branch water that had been diverted to Butte Creek. I silenced him by asking him for his authority to appear.

He had not secured authority from any federal higher ups. Attorneys for other land owners on Butte Creek also made appearances and argued in support of the motion. There were seven lawyers who spoke against the B.O.A. In between I argued using anything I could think of in opposing the motion. We kept going until the noon recess.

By noon I had concluded that the worst that could happen, if the examiner granted the motion to dismiss, would be that the B.O.A. would have to start over with a new complaint which could be drawn to avoid the grounds on which the original complaint had been dismissed. I decided that there was a good chance the motion would be denied.

When the hearing resumed after lunch, I got the floor and demanded a decision on the motion claiming that too much time had been spent arguing it and I wanted to get on with the case. This was a little rough on the examiner as I had been the one who had dragged the argument out in the morning. The opponents also were ready for a ruling on the motion. The examiner denied the motion to dismiss and we proceeded with the hearing.

This detail has been related here because this procedure took me by surprise. To this day I am not sure whether the attorneys were spoofing me for not being a lawyer or whether they thought they had real grounds for dismissal. The fact that they had secured the attendance of so many other attorneys inclines me to the opinion that they thought they could get the case dismissed.

The fun was not all over when testimony began. I called a preliminary witness to identify some documents I needed to use in my testimony and then put myself on the stand. To preserve the form of the record, I asked myself a general question regarding the

issues of the case, asked if I had made an investigation of the properties and operations involved and to state the conclusions I had reached. I then started on the presentation of my material without further questions.

All went well for a while until one of the opposing lawyers objected to my testimony using the usual grounds, irrelevant, immaterial, and not within the issues. I had to argue against his motion to strike. The examiner ruled in my favor a couple of times and I proceeded. Fianlly one of the opposing attorneys attacked my testimony on the ground that he could not tell when I was testifying and when I was arguing. I countered this by offering to have everything I had said considered to be under oath if the attorneys would accept the same rule for their arguments. This was rejected by the opposing attorneys. I then offered to rise from the witness chair when I was arguing and to be seated when I was testifying. This also was rejected. I managed to get in all of my exhibits and testimony. The testimony of the B.O.A. was completed at this first hearing on Sept. 20 and 21, 1932. The opposing attorneys then asked for the usual time to prepare their testimony. Later hearings were held.

The principal issues in this case were the extent of the water supply dedicated to public use throught the Powers Ditch and the omission of the agricultural users from the transfer proceedings in 1927.

The testimony showed that during the water shortage in 1931, the PG&E had diverted water to Butte Creek that should have been used to supply the Powers Canal. I secured the records of the PG&E to support this claim. When Paul Downing was testifying for the

PG&E he admitted that it had been "embarassing" to the PG&E when it had found out that this had been done.

When the PG&E sold several of its municipal water supply systems to the California Water Service Co. there had been the usual hearing on the transfer. This was a consolidated hearing for all of the systems that were involved. Notices of this procedure had been sent to the cities whose systems were being transferred. However, no notice was sent to the consumers outside of these cities such as the B.O.A. I contended that the B.O.A. was entitled to a reopening of the transfer proceedings to present a showing on how its service would be affected by the transfer. The transfer case, Application 13429, was reopened and combined with Case No. 3292.

There were a number of adjournments in Case 3292. It was finally submitted. I filed the opening brief for the B.O.A. on June 29, 1934 and the closing brief later in 1934. The Commission made its Decision 28162 on Aug. 6, 1935.

My opening brief is Item 66 and my closing brief is Item 65 in my bibliographical file.

I felt that the R.R.C. decision did not give consideration to all of the matters raised in these cases and I asked for an argument in banc before the full membership of the Commission. This can be done only where one member of the Comission may have heard the case. This request was granted and the argument was held on Nov. 4, 1935.

Decision 29398 dated Dec. 21, 1936 was the close of Application 13429 and Case 3292. In this decision, the Commission denied my application for a rehearing on Decision 28162. It made one minor

correction in Decision 28162 but turned me down on the other points I had raised.

In spite of my very eloquent (?) and just (?) argument to the Commission in banc, I got nowhere in reopening the issues involved. The closure of this case came five years after the 1931 shortage.

During the procedure on Case 3292 I had found that the contract for service of the B.O.A. was expressed in terms of miners inches with a 6 inch pressure (1/40 second foot) and the B.O.A. was being billed in terms of 4 inch pressure (1/50 second foot). I filed a rate case to correct this. I limited this to a general rate case for the irrigation service from the Powers Canal in order not to get involved in municipal water rates in Oroville.

The B.O.A. rate complaint became case No. 3558. In order to remove any question relating to the form of procedure the Commission on its own motion made its own case (No. 3612) in the rates involved. These two cases were consolidated for hearing. Case 3558 was filed April 10, 1933. Hearings were held in Oroville June 22 and July 13, 1933. The Commission's Case 3612 was filed between these two hearings. Both cases were submitted without briefs on July 13, 1933. Decision 26351 was dated Sept. 18, 1933. A rehearing was granted on petition of the B.O.A. and held on Feb. 14, 1934. These cases were then resubmitted.

Briefs were filed under the resubmission. I prepared the opening brief of the B.O.A. dated Feb. 23, 1934. It is Item 64 in my bibliographical file. I also prepared the reply brief for the B.O.A. dated March 16, 1934. This is Item 63 in my bibliographical file. On September 11, 1934 the Commission in Decision 27346 affirmed

its Decision 26351. This ended this case.

I made the following statement at the Annual Meeting of the B.O.A. in February, 1937.

> "On December 21, 1936, the Railroad Commission made its final decision in the case filed in 1932 covering the shortage in service in 1931. This case has been submitted for over a year. No essential change was made in the earlier decision on which argument had been granted. The Commission refused to find a dedication of additional water but stated it would supervise service should similar shortages arise in the future. The Berkeley Olive Association has been held to have equal service rights with other irrigation users and it has also been held that the California Water Service Company should operate its pump in Oroville at such periods. Under these rulings it is felt that serious shortages in the service to the Association will not arise and that the water supply available to the Association is adequate and dependable for its needs."

In these procedures I encountered what I considered to be inertia or indifference on the part of the engineering staff of the R.R.C. Murray Mackall was then in charge of the hydraulic engineering section. Bill Stava was the next in line. Mackall opposed the rate case. I had been negotiating a voluntary adjustment of the B.O.A. rates with the California Water Service Co. and thought I was making progress. When the California Water

Service lost interest in these negotiations I found Mackall had advised the president of the company that the B.O.A. could not qualify to bring a rate case. At that time I felt he was trying to avoid the work he would have to undertake if such a rate case was tried.

I learned a side of R.R.C. procedure in these cases which engineers seldom get to see. The result did not enhance my opinion of the Commission and its staff. When the R.R.C. was given expanded duties in 1911 the first members appointed by Gov. Hiram Johnson represented a very high type of individual. Over the years the appointments, in my opinion, have not maintained this high standard. It happens that the terms of members of the Commission expire a few days before the end of the Governor's term. This gives an opportunity for an outgoing governor to appoint members to the Commission just before he leaves office. In some cases it appears that such appointments may have been based on preceding political service rather than the value of the appointee's service on the Commission.

While the B.O.A. was not successful in securing a decision supporting its claims regarding its rights of service, the extent to which it pressed these issues and the character of the operations in 1931 which was brought out in the hearing were sufficient so that the conditions in 1931 have not been repeated in later equally dry years. The reduction in rates has also been helpful. All in all, in my opinion, it was worth while to have made the effort.

FEDERAL LAND BANK REPORTS

In 1933, the terms of federal land bank loans were modified to permit shorter term loans on less permanent security. The previous farm mortgages had usually been for forty years. This required that the mortgaged land have a dependable water supply for this period. The federal land bank, in its western branches, had established engineer-appraisers who made investigations and reports on the water supplies offered as security for land bank loans.

The engineer-appraisers were started soon after World War I. J hn T. Whistler was the first chief of this group. He had been project manager of the Truckee Carson I.D. when I had been working on its water right adjudication and asked me to suggest engineers for positions in the regional banks. I suggested G.H. Russell, who became engineer-appriser in Texas and J. Winter Smith who went to Montana.

Later when the constitutionality of the Federal Land Bank Act was in court these positions were discontinued. I secured Russell to handle the field work for the state in northern Tulare County in 1920, and Smith returned to California and later became manager of the state's Delhi land settlement colony.

When the so-called "commissioner's" emergency loans were authorized in 1933 as a depression measure, the engineer-appraisers had been re-established. Russell was chief for the Berkeley banks. The volume of work required to meet the demands for these loans exceeded what the regular staff could do. It was decided to use outside engineers to make general reports on local areas having similar water supply conditions.

Most of the problems of the banks relative to the new loans were in areas where ground water was used as the source of the irrigation supply. Overdraft was occurring in many of those areas. The bank needed advice on whether the existing sources of supply represented a safe risk for 20-year loans.

I was asked to make reports for the land bank in 1933 on the relation of local water supply to the security of federal land bank loans. I spend much of the summer of 1933 on the field work involved and made five reports which are in my bibliographical file. These are:

No. 57 Water Supply of Ventura County in Relation to Federal Land Bank Loan, Sept. 1933.

No. 58 Water Supply of Orange County in Relation to Federal Land Bank Loans, Sept. 1933.

No. 59 Water Supply of Santa Clara Valley Water Conservation District in Relation to Federal Land Bank Loans, Nov. 1933.

No. 60 Water Supply of Hollister and San Juan Valleys in Relation to Federal Land Bank Loans, Dec. 1933.

No. 61 Water Supply of Morgan Hill-Gilroy Area in Relation to Federal Land Bank Loans, Dec. 1933.

For Item 59, I also made a supplemental report in May, 1934 using the ground water records for 1933 which had then become available. It is included in Item No. 59.

In these reports I estimated the rate of change in the elevation of the ground water that could be expected to occur under the probable pumping draft of the next 20 years. Consideration was also given to the quality of the ground water. Recommendations were made on the basis that should be used in making loans in these areas.

As the ground water conditions varied in the different parts of these areas, my recommendations also varied. In a few areas I advised against loans, but generally the ground water supplies appeared to be adequate for the next 20 years without an extent of lowering or change in quality to endanger the security of 20 year loans.

The period of the loans made on the basis of these reports has now elapsed. In some cases supplemental sources of water supply have been secured. I know of no cases in which the water supply became exhausted within the period of these loans.

These reports served a useful purpose at the time they were made. They may have some interest as a basis for comparison of conditions then with these in later years. These reports were based on the record secured by others as time was not available to make independent observations. These reports did, however, bring together , available information in a more complete form for each area than had been done at that time by other agencies.

The commissioner loans made in the 1930's were a material aid to many land owners in increasing their borrowing so that they could hold on until better times.

WORK FOR STATE OF OREGON

WALLA WALLA RIVER CASE

In 1934, the case brought by the State of Washington against the State of Oregon for an equitable apportionment of the waters of the Walla Walla River came to trial in Walla Walla. Being a case between sovereign states it was heard by a master appointed by the U.S. Supreme Court. Will W. Ray of Salt Lake City was the master.

I was asked to prepare testimony for Oregon in this case on March 12, 1934. I flew to Portland on March 28. It was a rough flight. The pilot got off course and flew over Honey Lake. However, we missed Mt. Shasta and made Medford. I worked on the report and in the field until April 5 when I testified.

Geo. T. Cochran and C. Q. Randall were the attorneys for Oregon. I had known the State Engineer, Chas. E. Stricklin, in the Assoc. of Western State Engineers and had been asked to work on the case on his recommendation. John Cunningham was the attorney for Washington. James G. Woodburn, then on the faculty of the Agricultural College at Pullman, was the engineer for Washington. O.W. Powers of the Oregon Agricultural College at Corvallis and A.M. Piper of the U.S.G.S. were also witnesses for Oregon.

This was a very pleasantly handled controversy. The hearing was very dignified and polite. The cross-examination was courteous. I had been used to some pretty rough cross-examination and had to adjust myself to the change.

I spent the few days I had available for preparation in analysing the facts and issues. To expedite the trial, the two

states had stipulated to the uncontested facts. These stipulations were binding on both sides and I could accept them as proven in my testimony.

The main issue was the amount of water reasonably needed for the irrigation of the orchards near Milton, Oregon. These were very coarse soils requiring very frequent irrigations. The parties had stipulated to the need of irrigation on these lands at seven day intervals. I used this result with the length of the irrigation season to derive the necessary number of irrigations and multiplied this by the minimum reasonable depth per irrigation with which these lands could be irrigated to derive the seasonal acre-feet per acre reasonably needed. This result supported the previous local adjudication in Oregon and was used by the master to support his finding that use in Oregon was reasonable.

Oregon won the case in a decision in 1936 holding Washington was not entitled to restrict existing uses in Oregon.

I did not have time to prepare any report on my work on this case before testifying. I did, however, prepare an outline of my testimony with the supporting notes. This file is Item No. 151 in my bibliographical file.

The master Will W. Ray was the attorney for one of the Associated Canals pumping from Utah Lake. In 1937, on his recommendation, I was engaged to prepare testimony in a general adjudication case then pending on Utah Lake. This is described in a later portion of these memoirs.

This case was the beginning for me of some very pleasant acquaintanceships. I formed a friendship with Judge Cochran which continued for many years. He had made many of the adjudications

for Oregon under its 1909 water right code. He became a member in 1939 of the commission to review conditions on the USBR projects. The report of this commission formed the basis for the Reclamation Act of 1939. In Aug. 1965, I stopped in La Grande, Oregon and saw his life long-law partner, Colon R. Eberhart. Judge Cochran died in 1964. He had been a very useful citizen.

After this case was over, Cunningham, the attorney for Washington, and I used to meet cordially at N.R.A. conventions. He later asked me to review Washington state legislation he was preparing. Woodburn later went to the University of Wisconsin where he is now (1965) dean of the civil engineering department.

This case was a model in decorum.

I enjoyed all of my work on it.

KLAMATH LAKE CASE

This case involved damages resulting from a break in a levee on Klamath Lake. The defendant was the S.P. Co. and the plaintiffs the State of Oregon and others. I was asked by Oregon to work on it for the state. I began in May, 1942 and made trips there into 1943. The case was settled by negotiation. I did not make any formal reports and did not testify.

The S.P. crosses an eastern arm of Klamath Lake on a fill to save distance. To prevent flooding behind this fill, a local tributary stream was channeled to the Lake betwen levees and through an opening in the R.R. fill. The S.P. had become responsible for the maintenance of these levees. A break occurred which flooded the state highway. Oregon sought to recover for its repair.

The issue was one of negligence in maintenance. I collected what information I could and concluded the S.P. had been negligent.

When it looked as if the case might go to trial, the attorney for the S.P., who had not been told I was already working on the case for Oregon, called me up to see if I would work on it for the S.P. I told him I was already on the case and suggested that the S.P. might find a negotiated settlement advisable. The case was settled shortly after our talk. The extent to which my talk with the S.P. attorney may have influenced the settlement remains unknown to me. My chief recollection of this case is the cold wind that blew during some of my winter field work. I worked mainly with the engineers of the Highway Department.

5 7529